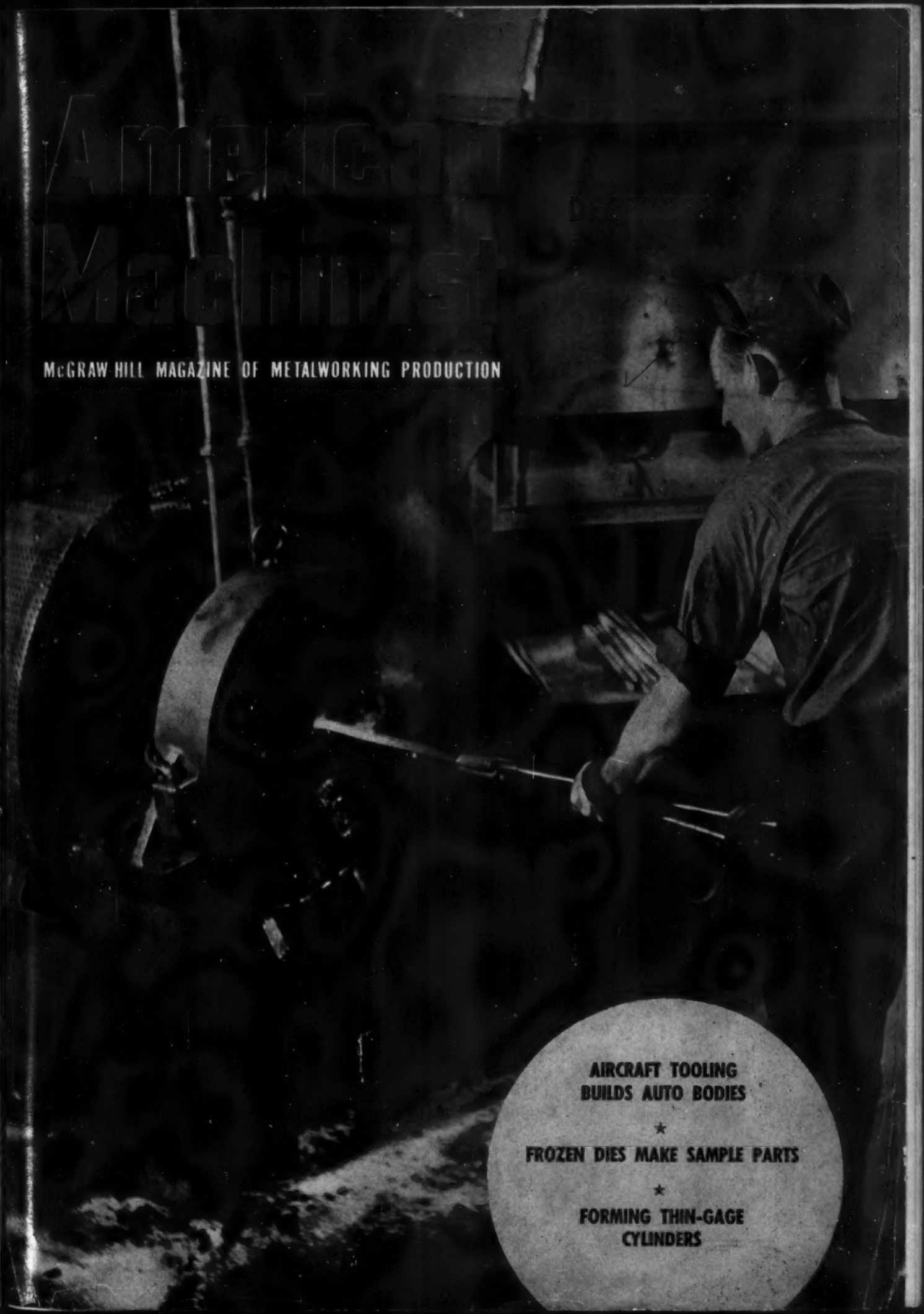
American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



AIRCRAFT TOOLING BUILDS AUTO BODIES

★

FROZEN DIES MAKE SAMPLE PARTS

★

FORMING THIN-GAGE CYLINDERS

EXCLUSIVELY NEW!
THE HEALD MODEL 261

VERTICAL COLUMN
SURFACE GRINDER

➡ Furnishes more rigid support, smoother finish, larger capacity

HERE'S A *completely new* Rotary Surface Grinder—the Heald Model 261 with exclusive "vertical column" design. The wheel spindle is carried on a column, and the chuck table rests directly on the ways of the base. The vertical slide carrying the wheel is mounted on anti-friction bearings. Results: rigidity...accurate feeding...smoothest possible finish. Cuts are heavier . . . speeds and feeds more variable . . . setups quicker.

The new Model 261 follows the Heald principle of grinding with wheel periphery for a perfect concentric finish. Further research and development have added many other unique features. **For unparalleled accuracy:** wheel spindle runs on a film of oil. **For increased capacity:** work height and swivel angle considerably greater than previously available. **For easier maintenance:** permanently lubricated throughout, leak-proof piping, conveniently grouped electrical controls.

You can get complete details at one of the Heald branch offices maintained for your convenience.

WRITE FOR BULLETIN on the new Heald 261. Features, photographs, specifications.

ANOTHER OF *18 NEW* HEALD MACHINES

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

TECHNOLOGY DEPARTMENT

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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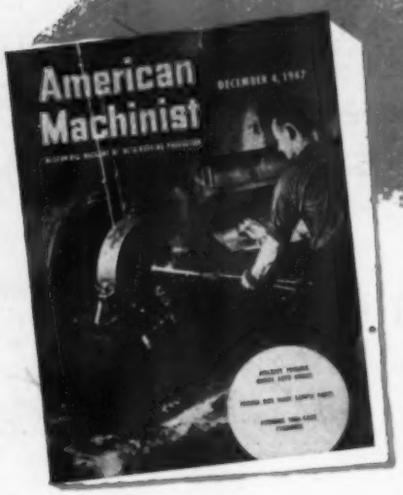


Chips and QUIPS

Our Cover . . . A sintered tungsten slug, heated in the furnace at right, enters a Torrington swager at Sylvania Electric Products Inc., Towanda, Pa., for the first of a series of reductions which bring it to heavy-wire diameters. Some is then centerless ground and cut to length by abrasive wheel (it is too hard to machine otherwise) for electrical contacts, heavy-wattage lamp or radio-tube leads sealed directly to hard glass, or other applications. The rest is drawn through diamond or carbide dies into ductile wire for light-bulb or radio filaments finer than human hair. Such wire, as small as 0.0018 in. dia., runs 950 miles to the pound, and 1,000 ft. on a spool are still invisible to the eye alone.

To produce tungsten, beneficiated ore is ground, digested and extracted to separate tungsten salts from iron, manganese, etc. Sodium tungstate, which results, is reacted in a hydrochloric-acid solution to produce tungstic acid. An alternate process produces ammonium paratungstate. Either salt is baked in a hydrogen-atmosphere furnace to reduce it to pure tungsten powder. This can be compressed into a friable slug which is sintered at 5000 F. by heavy electrical current.

The Kodachrome was taken by Henry Kirk.

Marshall Plan . . . Our special report in this issue is an analysis of the Marshall Plan, with some idea of its effects both on our domestic economy and upon exports (About 25% of the total loan will be expended on capital goods). The result of extensive investigation in Washington, it is a detailed study of the plan going far beyond press reports thus far available.

Seams . . . Wallace Mills adds to his series on forming thin metal an article that is practically a special report, dealing with open or lock seams in small cylinders and proper tooling for them. While we prefer to give you a number of short articles rather than fewer, longer ones in an issue, this 8-page story should be—and is—presented as a unit.

Ricker Again . . . Chester Ricker, our Detroit sleuth, gets around. There are two proofs of it in this issue, one his description of the homemade presses that build the Vanette bodies for the Ford chassis. Here is a reversal of common practice — aircraft-techniques applied in automotive production . . . Jumping from Delaware, Ohio, to Dearborn, Mich., Chester finds another example of ingenuity—Ford's use of frozen Wood's-metal dies for experimental parts. Freezing soft alloys in liquid nitrogen makes them hard enough for short runs.

Don't Miss . . . An oldtimer reminisces about a *jefe mecanico* job in Nicaragua that had everything except tools and help . . . Tony Zino tells all about viscosity index of hydraulic oils . . . A. H. Waychoff presents additional Short Cuts; other readers contribute many Practical Ideas.

Submerged Arc . . . At the new Buffalo plant, Westinghouse is welding motor frames on a production basis with the submerged arc. We bring you the story in pictures and captions, a fast-reading report by J. B. Arthur, welding engineer.

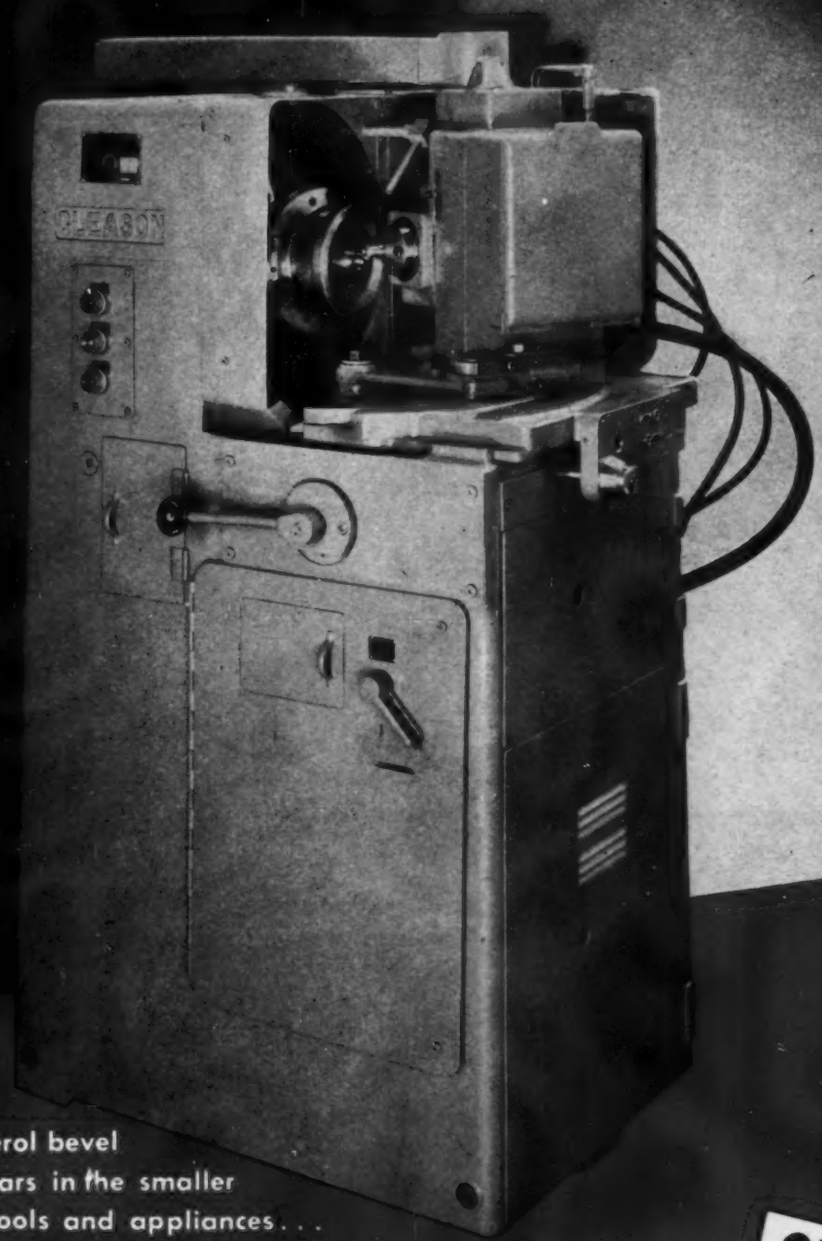
Coming . . . Dec. 18 A.M. will bring you a special report by Associate Editor Van Voast on Die Castings—again the result of much study and a dozen or more plant visits on trips as far west as the Mississippi . . . Our Moscow man heeds our request for details on Soviet "erosion machining," describing typical tools . . . Chester Ricker comes in with the details on Ford shifts from steel to aluminum and resultant weight savings . . . Then there are articles on spline gaging, production control, quality control, and other subjects, including a Christmas fable, a real seasonal present to go with our Christmas cover —which you and junior will both want to pin up—and for different reasons, we hope.

NEWS MAN . . . Joseph J. McGuinness, A.M. associate editor in charge of news, came with us last July. Peddie School and Columbia University, Mr. McGuinness entered the United Press foreign department in 1935. After 2½ years in the New York office, he moved to the Waterbury (Conn.) *Republican* as a combination reporter and deskman. Within a year he became wire and makeup editor.

Backed with mill and small machine-shop experience gained during summers while in school, Mr. McGuinness became inspection supervisor at Waterbury Tool Co. in 1942. He joined U. S. Time Corp., Waterbury, as assistant to the machining foreman on the Sperry gyro. After a year he became general foreman on the Lear actuator project, later was made assistant engineer on the mechanical time-fuze project. After the war he became product and development engineer at the Charles Parker Co., Meriden, Conn., for two years.

COMPLETELY NEW

THE GLEASON No. 2 HYPOID GENERATOR



Spiral bevel, Zerol bevel and hypoid gears in the smaller sizes for small tools and appliances . . .

better bevel gears cut at faster speeds than previously possible . . . hypoids in very small sizes from hypoid miters to high reductions of an extreme ratio of 45 to 1, superior tooth bearing made possible through closer control of actual cutting with many new machine features.

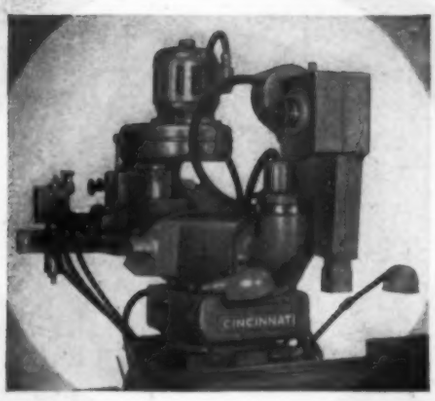
GLEASON Works
1000 University Avenue
Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years

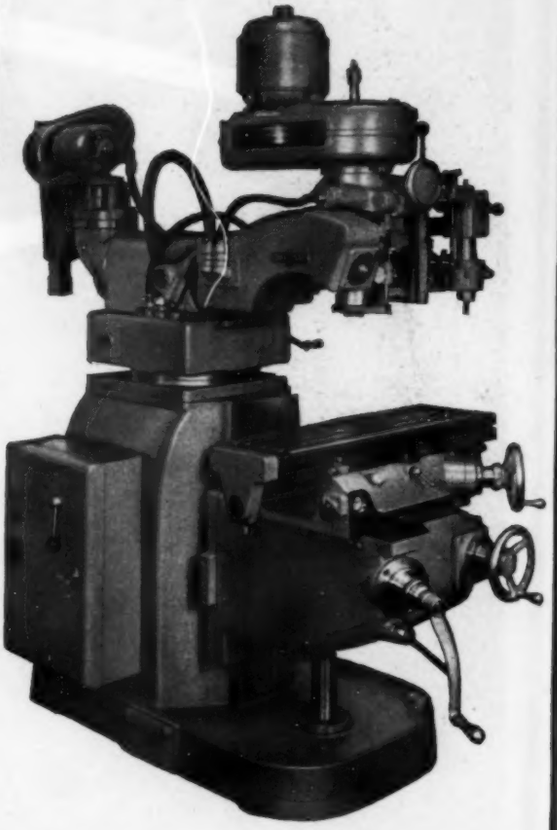
SENSITIVE LIGHT PRESSURE DUPLICATION

. . . plus

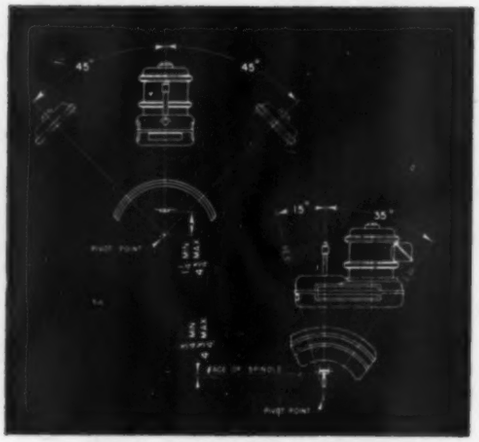
You can swivel the spindle head — crank controlled — in two planes, for angular milling.



Left: Just swivel the turret 180°, and the slotting attachment (extra equipment) is above the table, ready to go to work.



Illustrated above is the new CINCINNATI 8" x 18" Tool and Die Milling Machine. Complete specifications may be obtained by writing for catalog M-1620

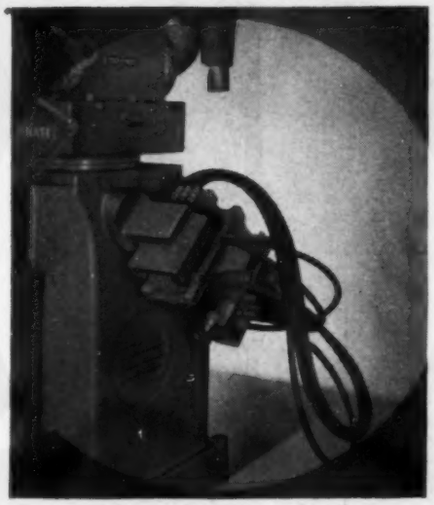


Right: Swivel range of spindle head. The important thing here is the *center* of *swivel.* It's close to the end of the cutter and tracer finger.

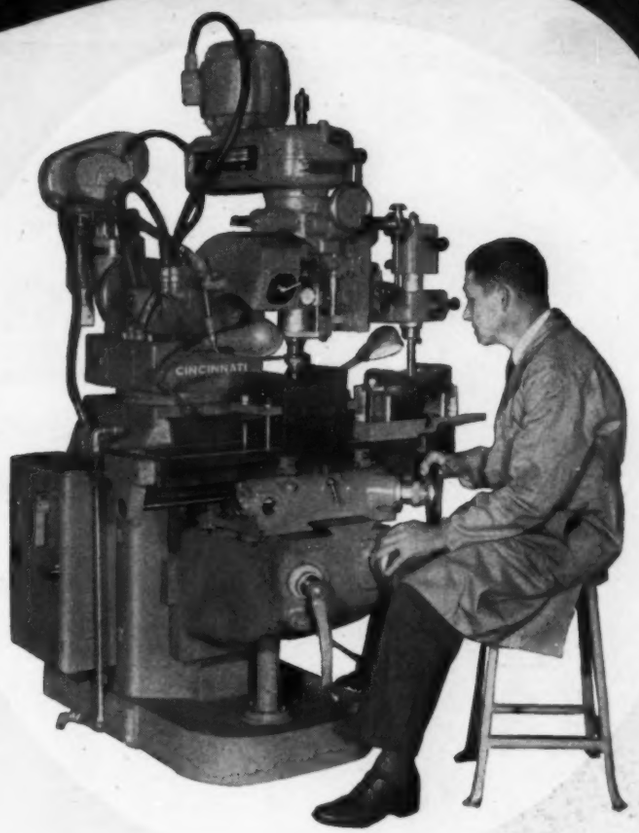
THE CINCINNATI MILLING

MILLING MACHINES

toolmaker versatility . . .



Hat rack for the tracer unit. You don't have to remove the tracer unit for all milling setups, but when you do, it's a simple operation . . . not necessary to disconnect hydraulic lines.



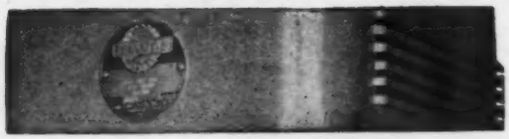
Above: Milling a golf club head forging die on a new CINCINNATI 8" x 18" Tool and Die Milling Machine.

CINCINNATI

Try this some time. With one finger, push down a balance scale enough to deflect it a few ounces. You'll find that a very light touch will do the trick. And that's about the same pressure exerted by the tracer finger of the new CINCINNATI 8" x 18" Tool and Die Miller. It follows vertical profiles automatically, with a touch so light that it does not mar wood or plaster masters. ¶ And that's not all. It has a host of features for the many milling operations incident to finishing the die complete. Some of them are illustrated here. They are so useful that you can't afford not to have a new CINCINNATI 8" x 18" Tool and Die Miller for making die-casting dies, small drop forging dies, plastic molds, and similar tool and die work. Further information about these efficient machines is contained in catalog M-1620. A copy will be sent on request.

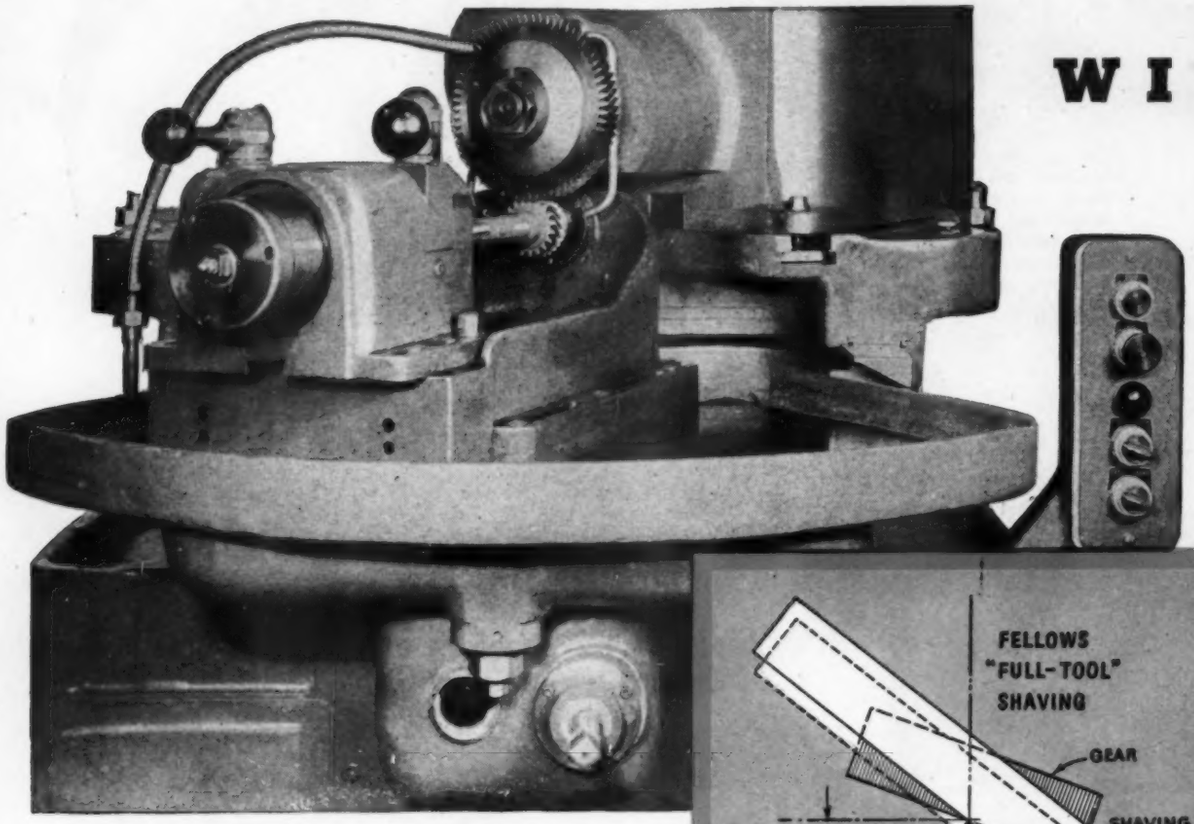
MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

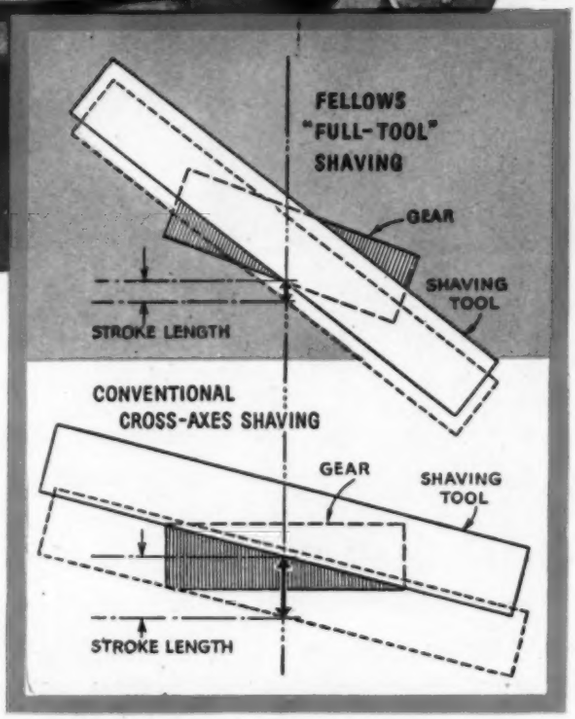


25% to 50% FASTER

WITH



No. 8 Fellows "Full-Tool" Gear Shaving Machine.



Simplified diagram showing relative positioning of gear and shaving tool indicating shorter stroke for "Full-Tool" shaving.

THE FELLOWS METHOD...MACHINES AND TOOLS FOR

SHAVING...

LONGER TOOL LIFE

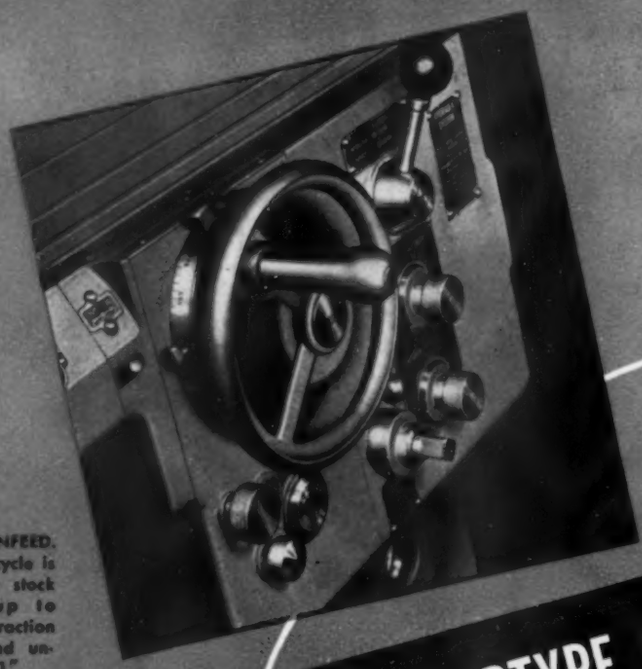
★ Fellows "Full-Tool" Shaving Speeds Gear Production —Improves Finish

Lower-cost shaving assumes new importance as a mass production finishing process. In the Fellows "Full-Tool" Method, (as illustrated in the accompanying diagram) the face of the gear tooth is precision-shaved with a much shorter reciprocating stroke than by conventional crossed-axes shaving. Another advantage is the fact that the cutting-action is broadly distributed over the face width of the tool, resulting in longer tool life. The shorter stroke and freer cutting permits higher reciprocating speeds... faster output.

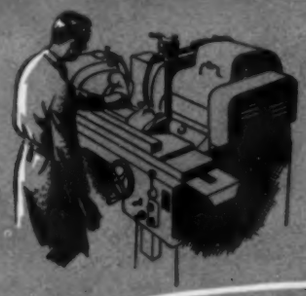
Every production man considering shaving as a finishing process will want complete information on the Fellows "Full-Tool" Method. Write: The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2, 640 West Town Office Bldg., Chicago 12, 7706 Empire State Bldg., New York 1.

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR



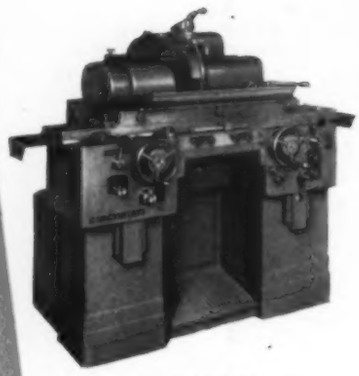
AUTOMATIC INFEED. Stroke for the cycle is adjustable for stock allowance up to .060", and retraction for loading and unloading up to 1".



Operator places the work on the loading cradle.

200 PRECISION CENTERTYPE GRINDING OPERATIONS

CINCINNATI



CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine. Built in 4" x 12", and 4" x 18" sizes. Complete specifications in catalog G-551.

Two legitimate gripes of high production workers . . . fatigue and tension . . . can usually be relieved to the satisfaction of everyone concerned. The way to do it is with equipment that's easy (effortless, if possible) to run, and that turns out the work to blueprint specifications hour after hour. The equipment illustrated here does both, and enables the operator to grind 200 armature shafts per hour. ¶It's a CINCINNATI FILMATIC 4" Plain Hydraulic Grinder. These machines have the basic qualifications for this job and other similar types of work . . . they size accurately and consistently. The operator has no worries about accuracy. And he maintains production with a minimum of effort because of two muscle-saving attachments — hydraulic footstock and automatic infeed. Three drawings at the top of these pages show how the operator turns out precision centertype grinding operations at a high rate of production. You may find out more about these machines by writing for catalog G-551.

CINCINNATI GRINDERS

CENTER TYPE GRINDING MACHINES

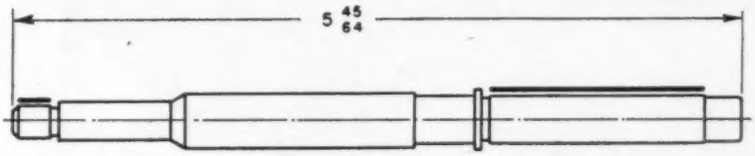
Moving the infeed lever to "IN" initiates the automatic cycle . . . footstock center engages work; work rotates and coolant starts; grinding wheel rapidly advances, grinds, tarries for sizing, and retracts; coolant stops and work stops rotating; footstock center retracts.

PER HOUR

While the automatic cycle proceeds, the operator can turn away to gage the work or dog the next workpiece.

. . . with negligible fatigue and tension

At the left is illustrated the HYDRAULIC FOOTSTOCK. In conjunction with loading cradles, it eliminates the operation of manually placing and removing the work between centers.

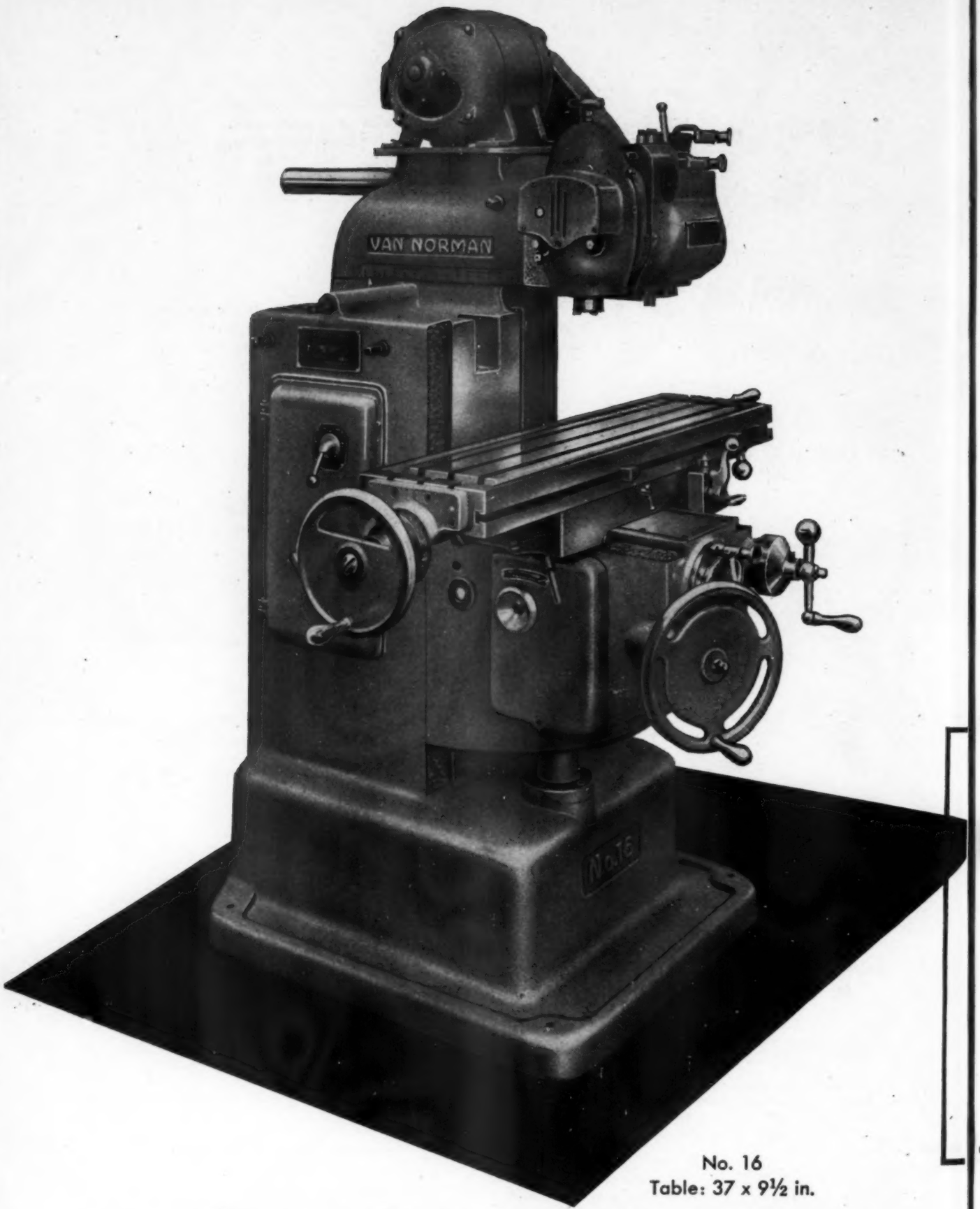


Drawing of armature shaft, infeed ground on CINCINNATI FILMATIC 4" Plain Hydraulic, equipped with Automatic Infeed and Hydraulic Footstock. Production is 200 per hour for each diameter. Tolerances ⅓ of blueprint allowance. Heavy black lines indicate the two ground diameters.

INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES



No. 16
Table: 37 x 9½ in.

"It pays to Van Normanize"

THE NEW VAN NORMAN NO. 16 RAM TYPE MILLING MACHINE

FEATURING THE ADJUSTABLE CUTTERHEAD, MOVABLE RAM AND BUILT-IN CONTROLS

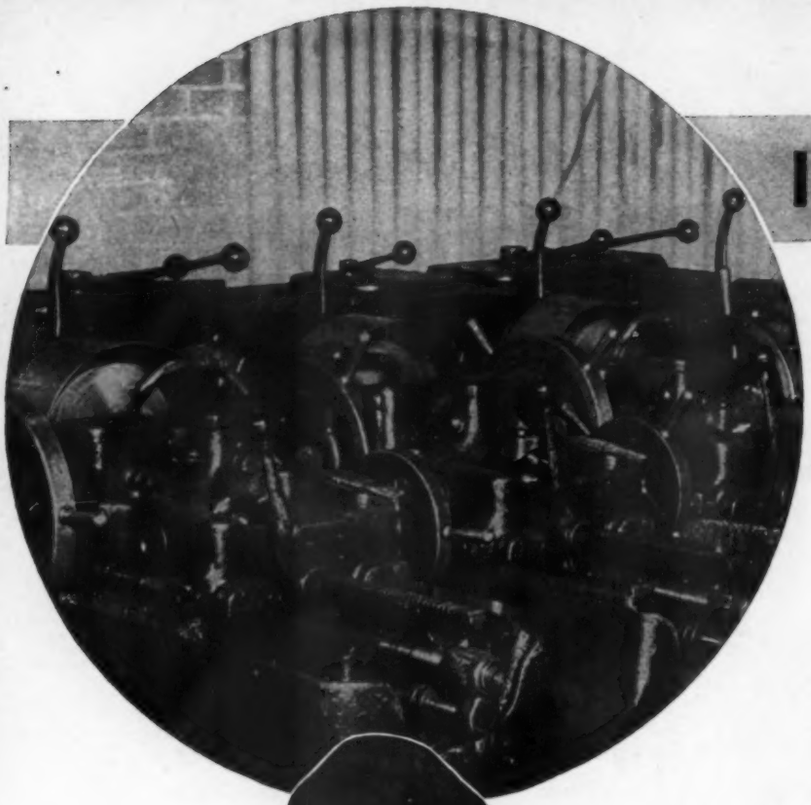
This new versatile miller . . . the Van Norman No. 16 . . . is especially applicable for tool room, pattern shop, die and mold shop, experimental laboratory and machine shop. Thoroughly modern design features . . . plus the adjustable cutterhead and movable ram . . . make this new miller outstanding in its work range. Not only does the No. 16 miller save time by minimizing work set-ups, but its versatility, accuracy and ease of control speeds up milling operations and cuts cost. Write for information and bulletin.

CHECK THESE VAN NORMAN ADVANTAGES

- Adjustable cutterhead permits conventional horizontal and vertical as well as angular milling with standard cutters and arbors.
- Movable ram in combination with saddle and knee movement increase versatility and work range of the machine.
- Single lever built-in controls, mounted on side of column, enable the operator to start and stop spindle only . . . or start spindle and coolant flowing . . . or start spindle drive, power longitudinal table feed and coolant. The same lever reverses spindle drive direction, etc.
- "Start-Stop" switch on front of knee permits operator to start and stop machine from the front operating position.
- Nine spindle speeds from 95 to 2000 R. P. M.
- Power feed is provided for table longitudinal travel. Nine feeds from 5/8" to 16".
- New heavy cutterhead plus new spindle transmission provides greater load-carrying capacity.
- Large hand wheels and large dials permit easy cross, vertical and longitudinal adjustments.
- Available with plain or universal saddle.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS



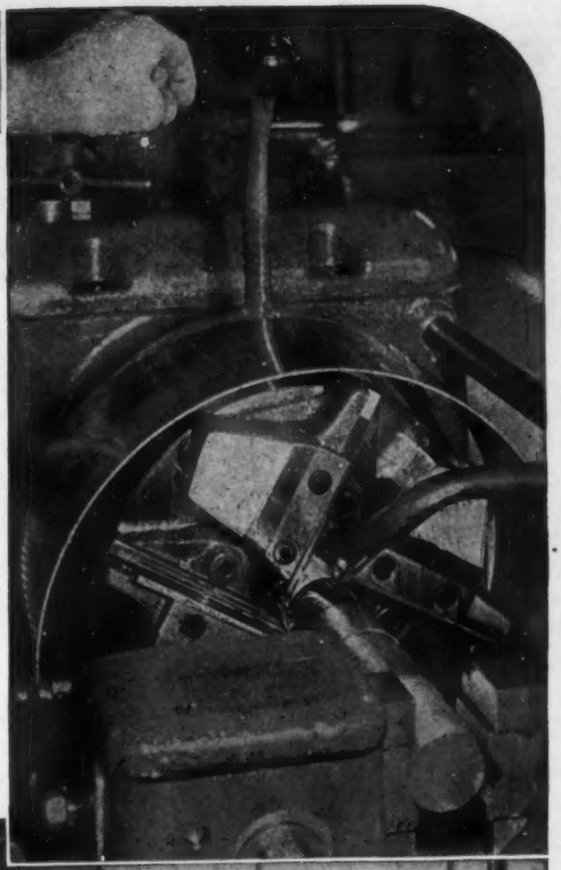
IN SINGLE, DOUBLE &

The LANDMACO Threading Machines are productive precision tools capable of economically handling many threading operations heretofore done by slower and more expensive threading methods.

The many features of these machines combine to assure great accuracy, ease of operation, and flexibility in making set-up changes. Every possible provision has been made to minimize or compensate for any wear that might affect their efficiency or

LANDIS

QUADRUPLE HEAD MODELS



accuracy. The Quadruple Head machine can be used efficiently for cutting long threads on bolts, rods, staybolts, etc. For jobbing or maintenance work, each spindle can be set for a separate diameter and pitch, eliminating frequent set-up.

Regularly equipped with the LANCO Head and the Landis Tangential Chasers, LANDIS Reverse Taper Heads can be supplied as special equipment for threading taper head crown bolts.

Write for Bulletin H-75

MACHINE CO. WAYNESBORO PENNA. U.S.A.

"Engineered Grinding Service"

Saves Special Machine Cost ..... Gives Faster Delivery

by modifying a standard grinder for a special job

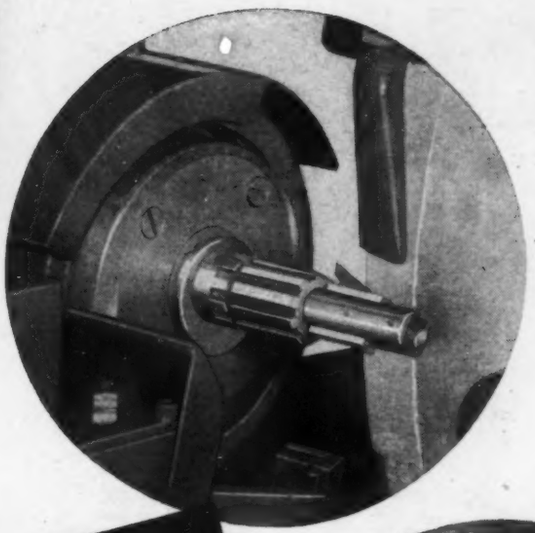
Modified 6" x 18"
CH Plain Hydraulic Grinder

EQUIPPED WITH MICROSPHERE BEARINGS

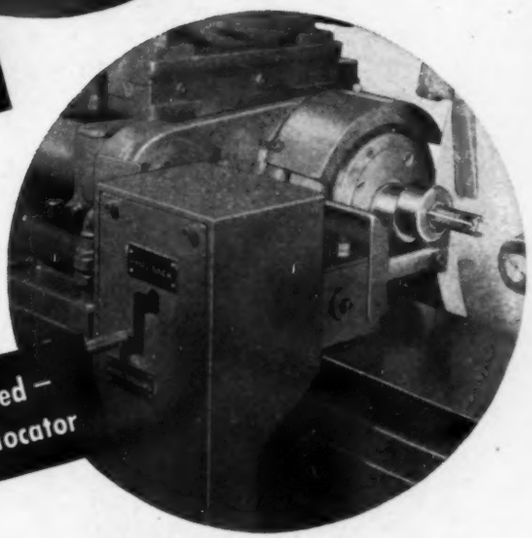
LANDIS TOOL

Precision Grinders

Grinding hydraulic pump cams



Off center work holding fixture



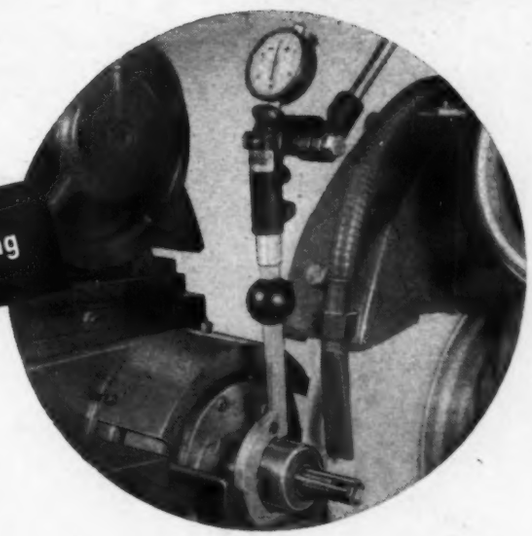
Hydraulic rapid infeed – Bed mounted work locator

STANDARD FEATURES

Two Speed Hand Traverse
Microsphere Bearings
Hand or Automatic Wheel Feed
Dual Cylinder Hydraulic Traverse

SPECIAL MODIFICATIONS

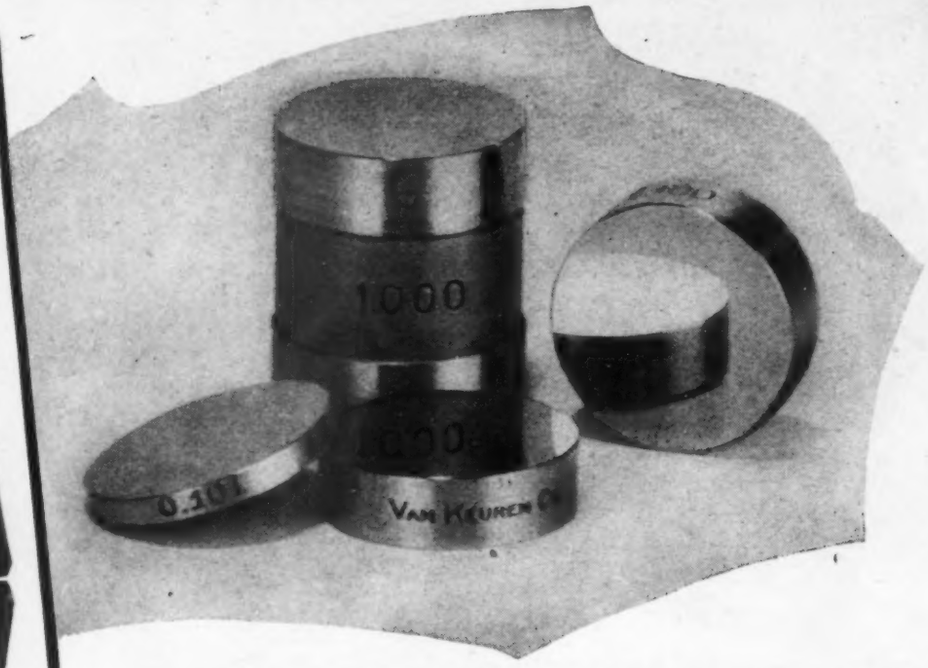
Off Center Work Holding Fixture
Visual Sizing
Hydraulic Work Holding
Live Spindle Headstock
Reciprocating Mechanism
Hydraulic Rapid Infeed
Bed Mounted Work Locator



Visual Sizing

LANDIS TOOL COMPANY, WAYNESBORO, PENNA.

Shop uSet MTT . . . 35 blocks giving 140,000 combinations in tenthousandths. Price in mahogany case, $100.00.
Economy Set M1 . . . Over 3000 combinations in thousandths. Price in mahogany case, $40.00.
Micrometer Set M2! . . . Includes 1", 2", 3", 4", 5" and 6" Microgages. Price in mahogany case, $60.00.
Toolmakers Set M64 . . . Gives 121 combinations in 16th., 32nd and 64ths. Price in mahogany case, $17.50.



THE NEW VAN KEUREN 7/8" DIAMETER MICROGAGES, ...are the best buy

60% more wearing surface . . . 25% greater accuracy . . . Body true cylinders . . . Ends square with body . . . No increase in price

A FOUNDATION FOR ACCURACY FOR 25 YEARS

Van Keuren Microgages have been popular for over 25 years, because they provide a low cost means of securing accuracy in the shop, to meet the demands of the inspection department.

The original Microgages were made 11/16" in diameter. The ⅞" body diameter of the NEW Microgages are ground true cylinders, and the end surfaces are held square with the body within close limits. This enables them to be easily aligned on machine ways for measuring carriage travel. The new Microgages have 40% more wearing surface than rectangular gages and they wring together tenaciously. The ⅞" diameter body provides excellent rigidity for the 6" long blocks.

Microgages up to 1" length are held within a tolerance of plus 12 millionths minus 8 millionths. They have an average wear allowance of 4 millionths oversize. They are available as individual gages from .0625" to 6" length, or in sets especially designed for general shop use, for tool setting and for tool makers and machinists.

THE *Van Keuren* CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

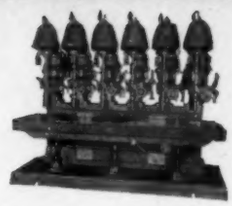
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

THE FINEST DRILL PRESSES MADE BEAR THE CANEDY-OTTO NAME

FINE ENGINEERING

QUALITY CONSTRUCTION

FINER PERFORMANCE

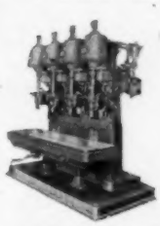


6-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

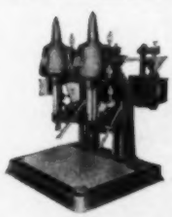
14" No. 3000 F.V. 1-SPINDLE SENSITIVE FLOOR DRILL

16" No. 3000 F.V. 1-SPINDLE BOX COLUMN FLOOR DRILL

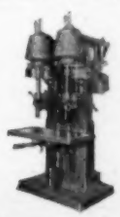
21" BOX COLUMN SLIDING HEAD FLOOR DRILL



4-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL



16" No. 5-10,000 R.V. 2-SPINDLE BENCH DRILL



2-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

World's Most Complete Drill Press Line

Fine engineering *plus* quality construction equals finer performance. And you get it all in a drill press that carries the CANEDY-OTTO trade-mark. Around the world, the finest drill presses made bear the CANEDY-OTTO name. So before you buy, check the CANEDY-OTTO Catalog — the one source from which you can buy *ALL* your standard drill press needs.

CANEDY-OTTO MFG. COMPANY, Chicago Heights, Ill.

Have The Canedy - Otto Catalog On File For Ready Reference

Canedy-Otto Mfg. Company
Chicago Heights, Illinois
Please send illustrated catalog. (Insert No. 30)

NAME .....

ADDRESS .....

These Wheels Can Really

They're Made of the Sensational

32 ALUNDUM abrasive is entirely different from any other abrasive — made differently by a unique Norton-developed process. *There's no crushing to size* — each grain forms in the electric furnace as a single, complete, multi-pointed crystal. The result is a wheel that's *sharper* — that cuts faster and cooler.

And the grains of 32 ALUNDUM abrasive are over 99% pure fused alumina — no non-cutting slag nor pores. This means *greater resistance to dulling* — fewer dressings, longer wheel life.

The Greatest Cost-cutting Development in Abrasives in Over Forty Years

Cut Your Grinding Costs!

32 ALUNDUM®

For Faster Cutting

For Cooler Cutting

For Fewer Dressings

For Longer Wheel Life

The cost-cutting ability of 32 ALUNDUM grinding wheels has now been definitely proved — by over a year of steadily increasing use in thousands of plants. *They can cut costs for you, too.* Try them for cylindrical, centerless, surface, gear, tool and internal grinding. Ask your Norton abrasive engineer or Norton distributor for specific recommendations.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

W-1142

NORTON ABRASIVES

MORSE All Types

No. 2039. Spiral Fluted Taps: High Speed Steel (Fractional Sizes)

No. 2063. Spiral Fluted Taps: High Speed Steel (Machine Screw Sizes)
Designed for use in aluminum, die-cast metal, soft brass, copper, and stringy metals.

No. 2040. Hand Taps: High Speed Steel—Cut Threads (Fractional Sizes)
No. 2046. Hand Taps: High Speed Steel—Ground Threads (Fractional Sizes)
No. 2066. Machine Screw Taps: High Speed Steel—Cut Threads (Machine Screw Sizes)
No. 2068. Machine Screw Taps: High Speed Steel—Ground Threads (Machine Screw Sizes)
Designed for use by hand and by machine power.

No. 2115. Taper Pipe Taps: High Speed Steel—Cut Threads
No. 2119. Taper Pipe Taps: High Speed Steel—Ground Threads
Used for tapping pipe fittings, boilers and boiler plates, etc.

No. 2115. Taper Pipe Taps: High Speed Steel—Interrupted Threads
Used in copper and stringy materials where taps tend to tear.

No. 2082. Pulley Taps: High Speed Steel—Ground Threads
Same as No. 2046 Hand Taps, but with a long shank. For use in tapping set-screw holes in pulleys with hubs. Also for tapping oil-cup holes.

MAKES of Taps... *to give you Smooth, Strong Threads in any material*

No. 2045. Spiral Pointed Hand Taps: High Speed Steel—Cut Threads (Fractional Sizes)

No. 2047. Spiral Pointed Hand Taps: High Speed Steel—Ground Threads (Fractional Sizes)

No. 2067. Spiral Pointed Machine Screw Taps: High Speed Steel—Cut Threads (Machine Screw Sizes)

No. 2070. Spiral Pointed Machine Screw Taps: High Speed Steel—Ground Threads (Machine Screw Sizes)

Designed for use in sheet metal. Work very well in machine tapping of thru holes in all types of materials. This type of tap forces the chips ahead of the tap, so it should not be used in tapping blind holes unless sufficient chip clearance is allowed in the bottom of the hole.

Name your material—and Morse will supply you with the tap which has the right specifications for your particular job. The Morse line of taps is *really comprehensive* . . . embracing top-quality cut-thread or ground-thread taps of every type, both standard and special, to meet *your* requirements.

What's more, when you use Morse taps, you're sure of getting *smooth, strong* threads . . . threads which hold because they're cut with precision cutting tools of the highest quality. You'll get no clogging, no damaged threads . . . and you'll get faster tapping on every job.

So make a date today with your Industrial Supply Distributor. He'll be glad to cooperate in securing a Morse recommendation, and will *save you money* by getting the exact tap you need.

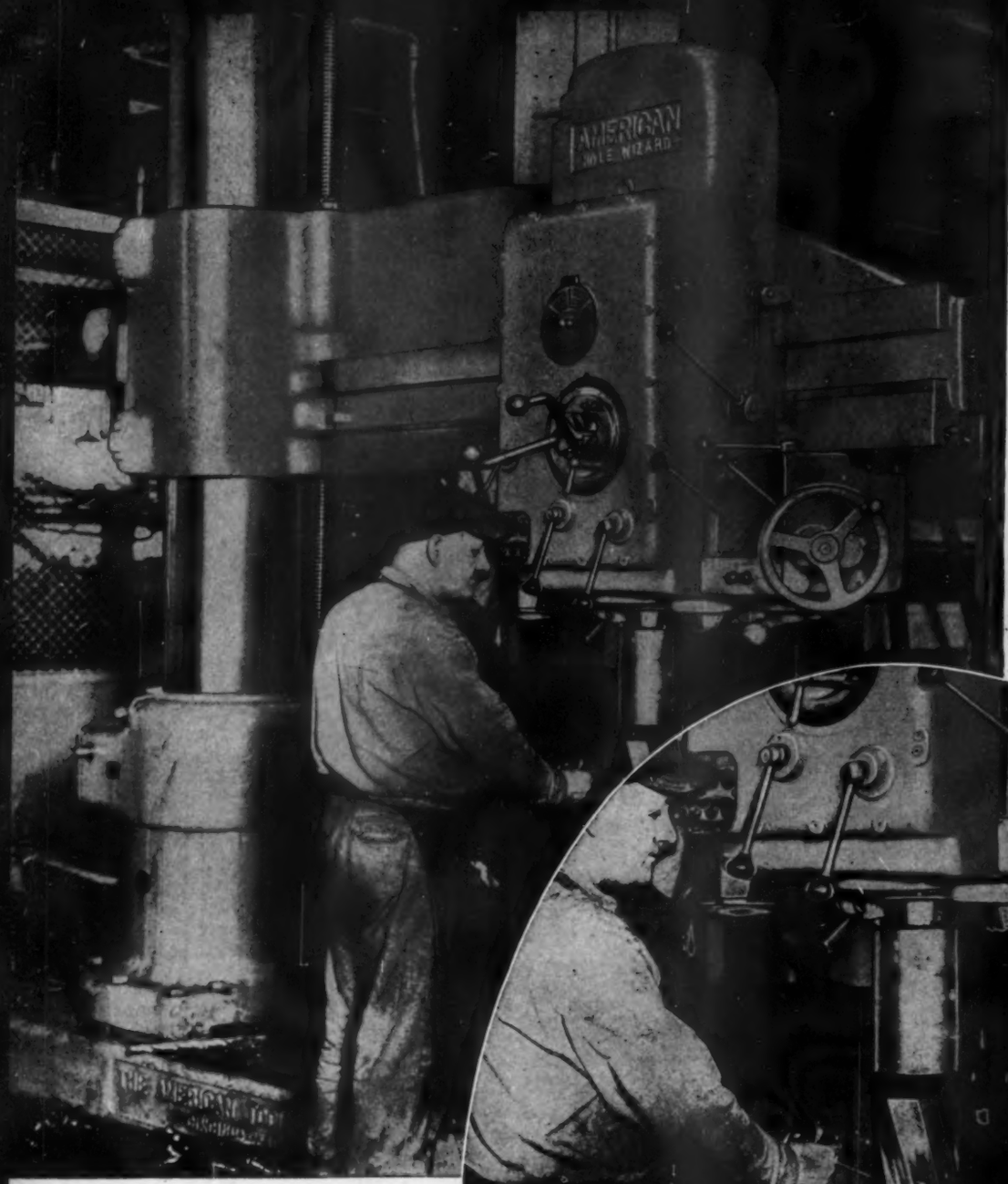
Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

NEW YORK STORE: 130 LAFAYETTE ST. • CHICAGO STORE: 570 WEST RANDOLPH ST. • SAN FRANCISCO STORE: 1180 FOLSOM ST.



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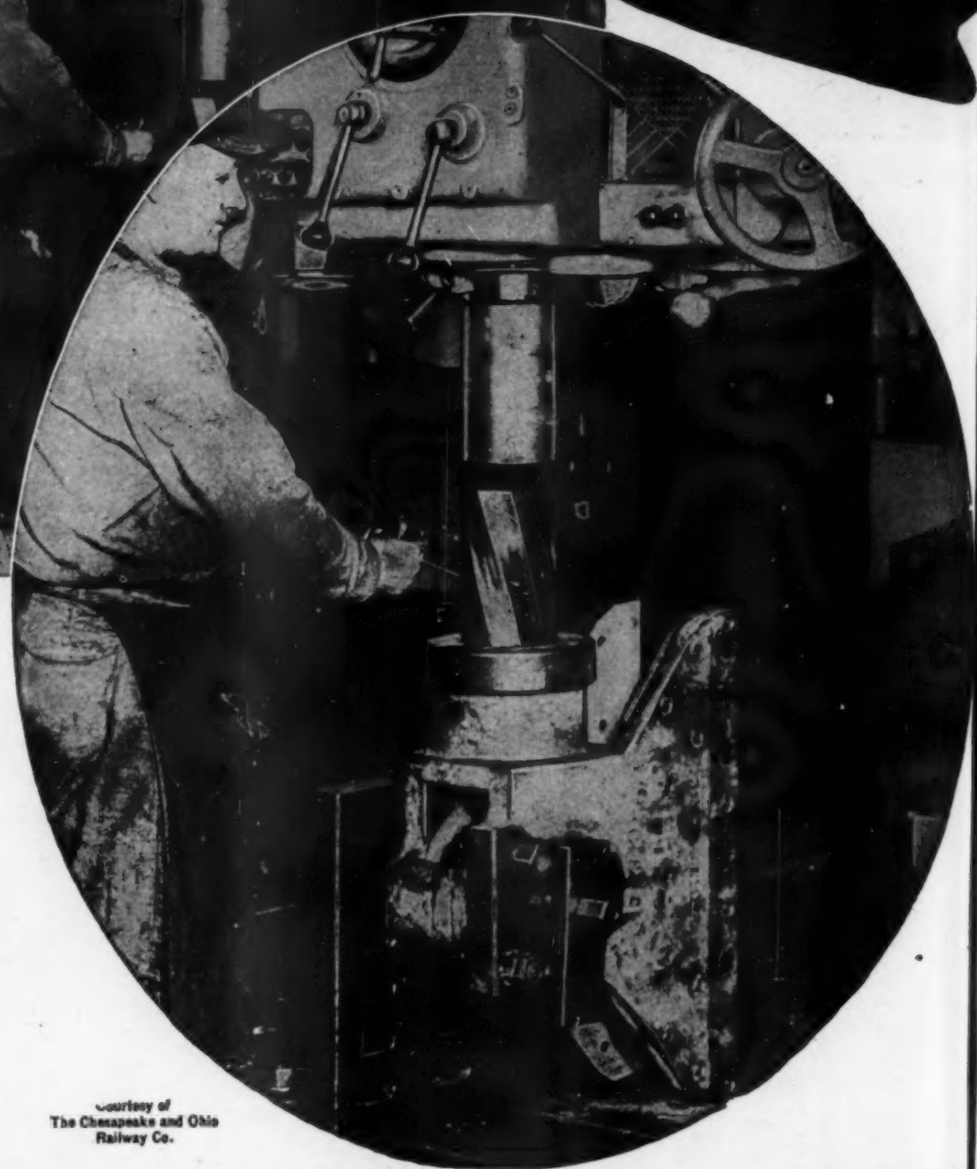


Taper reaming locomotive cross heads for piston rod fits.

Courtesy of
The Chesapeake and Ohio
Railway Co.

THE AMERICAN TOOL WORKS CO.

e Acid Test of SPINDLE CONSTRUCTION

Reaming cross heads for piston rod fits is about the toughest job you can find for a radial drill spindle.

This work must be done at slow speeds, without chatter and with a fine finish.

IT'S A TOUGH ONE BUT—

1 **The boring mill construction of the "American" Hole Wizard Spindle does the job. Its 100% anti-friction design with adjustment for wear insures frictionless operation and maintenance of original accuracy.**

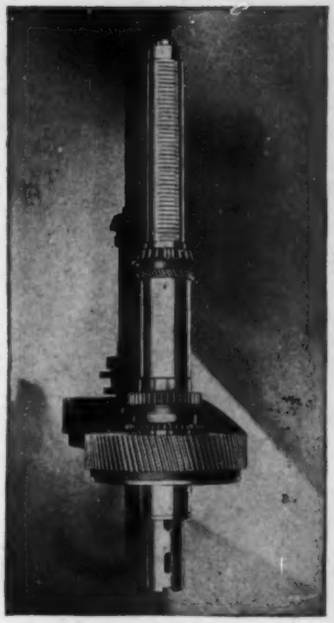
2 **The patented Double Lo-Hung Spindle Drive locates the large diameter driving gear at the bottom of the head close to the work, thus minimizing spindle torque.**

3 **The large diameter spindle, recently increased to add 37% to its rigidity, easily resists the enormous torsional effort imposed by this job.**

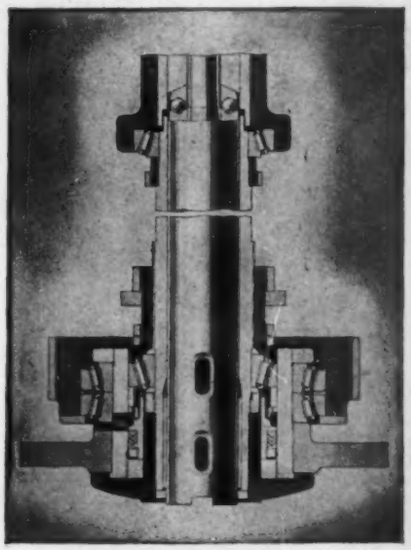
4 **Spindle shake is reduced to an absolute minimum by allowing only .00025" freedom between the ground nitrided spindle and the honed nitrided spindle sleeve. This is especially valuable on accurate boring operations.**

These four spindle characteristics are YOUR assurance that YOUR tough ones will be done easier, quicker and cheaper with an "American" Hole Wizard on the job.

Civilian goods and services must be produced in greater quantities and at lower costs. The "American" Hole Wizard Radial definitely is a contributor to this cause.



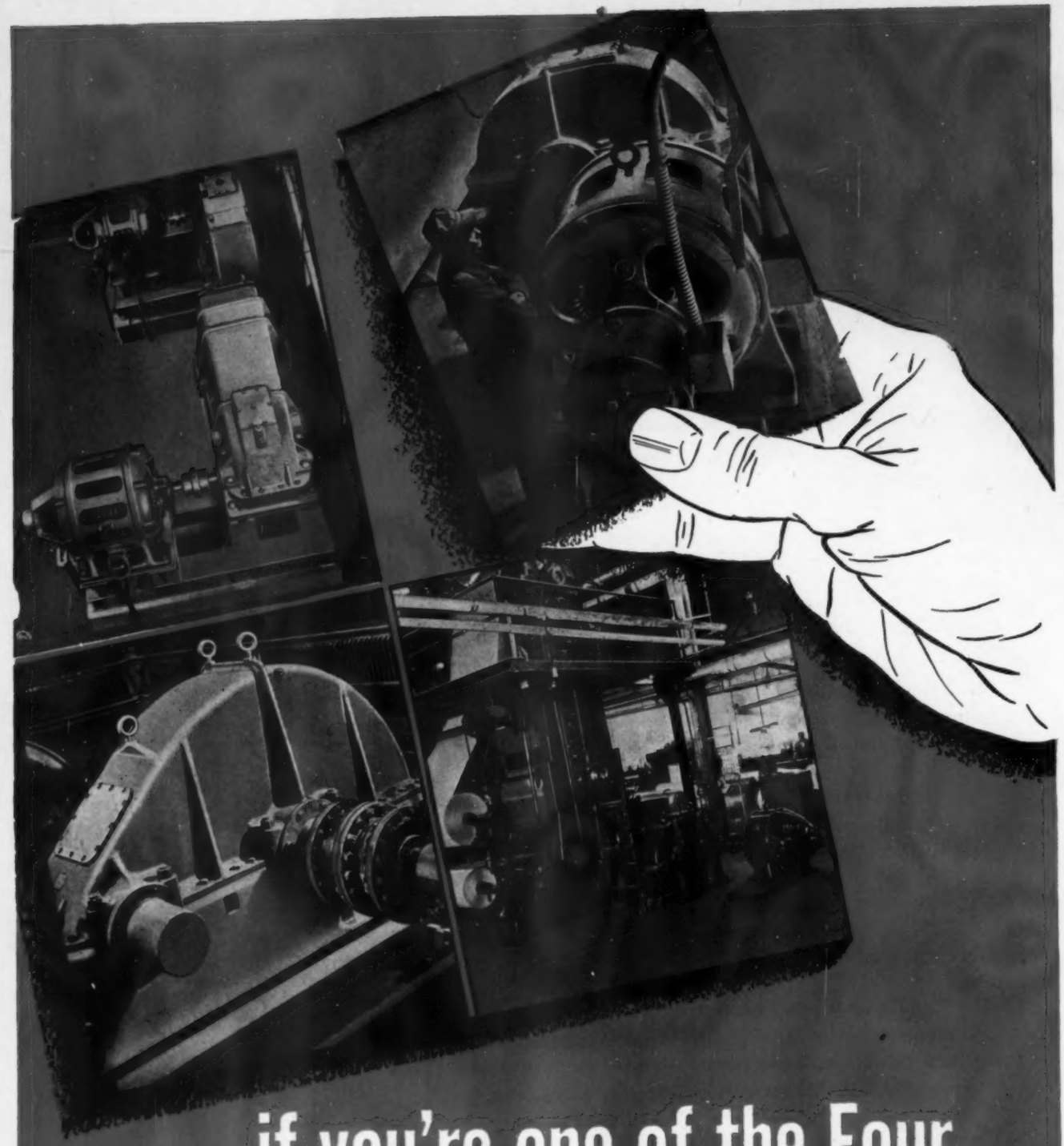
Patented Double Lo-Hung Spindle Drive.



Patented Double Lo-Hung anti-friction spindle mounting.

BULLETIN 327 TELLS THE STORY . . . YOURS FOR THE ASKING

CO. *Lathes and Radial Drills* **Cincinnati, Ohio U.S.A.**

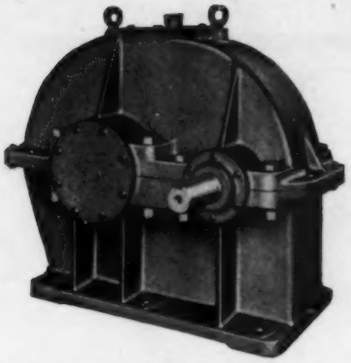


if you're one of the Four...

YOU'LL WANT THE 6 BENEFITS OF THIS PACKAGED DRIVE

WESTINGHOUSE

MEMBER OF AGMA



This Type SH speed reducer is a single-reduction unit which is furnished in thirteen standard ratios in each of twelve sizes. The Type DH speed reducer, which is a double-reduction unit, is offered in fifteen standard ratios in each of twelve sizes.

If your machines are among the four out of five that run slower than their prime movers, here are six ways you can profit by using Westinghouse speed reducers:

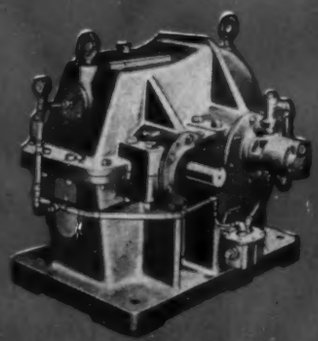
1. Improved power efficiency (one plant raised it from 80.9% to 85.4%).
2. Fewer inspections . . . only semiannual lubrication needed.
3. Maintain positive alignment of drive and driven machine.
4. Long service life through single helical gearing, specially heat-treated by exclusive Westinghouse BPT process.
5. Minimum power loss with antifriction bearings.
6. Precision operation from hot-cut gears.

Add to these benefits the advantage of unit responsibility with both motors and gear supplied by one manufacturer. You have your choice of twenty-four sizes of Westinghouse speed reducers—Types SH and DH—for drives up to 1,000 hp with speed reduction ratios of 2.82 to 70.5.

Write, wire or telephone to your nearest Westinghouse office today, for full information on the application of speed reducers to your own drives. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-07252

FOR DRIVES FROM 1 TO 75 HP CHOOSE GEARMOTORS

Within the standard listed range of 1 to 75 hp ratings, you get the best in speed reduction with Westinghouse gearmotors. Three types—A, C and E—are available and provide output speeds from 1,450 to 16.5 rpm. All unit types can be used with either single-phase, polyphase or d-c motors.



USE THESE HIGH-SPEED UNITS UP TO 2,000 HP AND 9,000 RPM

These Westinghouse Type SU units are specially designed for high-speed duty in speed increasing services for pumps, compressors and similar applications. Units are available in 30 sizes—with gear ratios from 1.25 to 3.25 up to 2 to 12.

You'll find all the facts on industrial geared drives in this new, picture-packed book. Ask for your copy of B-3730 today, on your business letterhead, please.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

4 out of 5 drives need speed reduction

For peak

THE NEW MONARCH

Speed, accuracy and economy of metal-turning have been our determining factors in developing the design of the new Monarch Series 60 Lathes, first announced at the Machine Tool Show. They're offered in two distinct series—toolmaker's lathes and engine lathes—both built in 14″, 16″, 18″ and 20″ sizes.

For modern metal-turning at its best—*for peak production at a profit*—check these "firsts" features, then ask us to give you complete details:

★ **CONVENIENCE OF OPERATION**—New, faster, fool-proof speed change, from simple, convenient automatic-locking head stock levers.

★ **SILENCE OF OPERATION**—Smooth-running helical gears give audible evidence of precision manufacture, for longer life and sustained accuracy.

★ **SIMPLER, SAFER LUBRICATION**—Filtered and metered force feed. Totally enclosed end gearing, spray-lubricated.

★ **HIGHER SPINDLE SPEEDS**—Greater horsepower for carbide tool use.

★ **RIGID, RUGGED CONSTRUCTION**—Greater weight. Hardened and ground steel parts throughout, including flame-hardened bed ways for both carriage and tailstock —and many other surfaces, at no extra cost.

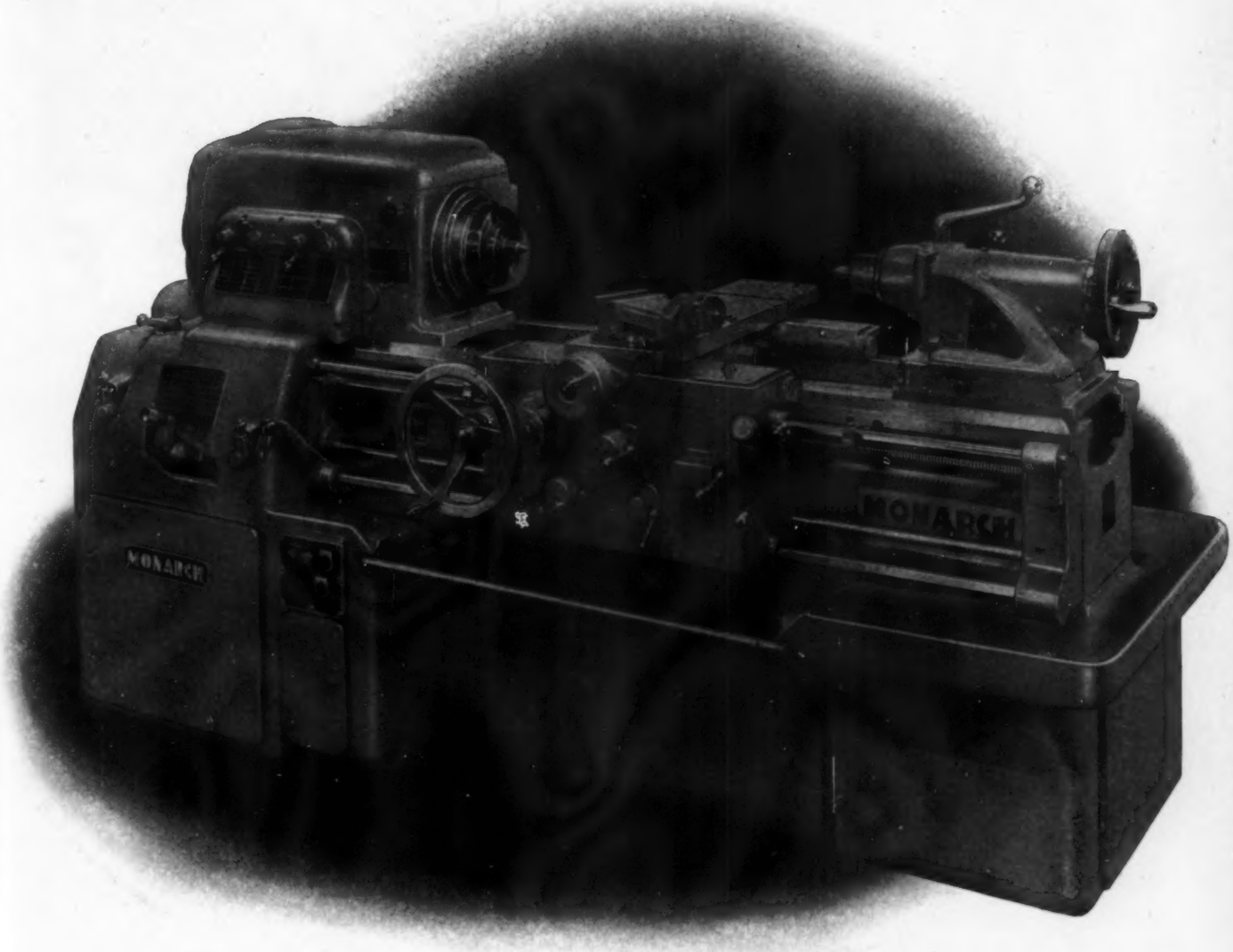
ACCURACY · ECONOMY · LONG LIFE

Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO.
SIDNEY, OHIO

production at a profit

SERIES 60 LATHES



PAST PERFORMANCE

...a safe guide for "The Tools You Buy Again"

Actual results — in terms of better, faster, more economical work—make standardization on UNION TOOLS a logical procedure and a sound policy. Years of specialization in development and manufacture has enabled UNION to produce long-lived, dependable small tools — tools that help keep production moving at maximum speed and accuracy at a minimum of expense.

Once you've put UNION tools to work, they'll be the "Tools You Buy Again." Performance will have been the basis for your choice.

UNION TWIST DRILL CO.
Athol, Mass.

STORES New York Store: 61 Reade St.; Los Angeles Store: 524 East Fourth St.; Chicago Store: 11 So. Clinton St.; Seattle Store: 568 First Ave., So.; San Francisco Store: 121 Second St.; Detroit Store: 5527 Woodward Ave.

MANUFACTURING DIVISIONS

S. W. Card Mfg. Co., Div.; Mansfield, Mass.
Butterfield Division, Derby Line, Vt., and Rock Island, Quebec

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates—Profile Cutters.

UNION

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

Helicopters made by Bell Aircraft were recently used to spray swarms of flying locusts in South America. A 98% kill was reported.

get ready with CONE for tomorrow

The Naval Research Laboratories are "growing" artificial quartz crystals for use in electronic devices.

be ready with CONE for today

The U. S. Bureau of Standards has developed a method of plating with nickel or cobalt that requires no electric current.

get ready with CONE for tomorrow

A magnified chart showing the shape, height and spacing of long waves, steps, fine roughness and other irregularities on machined or finished surfaces is provided by the Proficorder — a new Physicists Research Co. shop instrument.

be ready with CONE for today

Air speeds up to 7,000 miles per hour can be simulated for study by towing models at much slower speeds in a shallow tank of water. The method is in use in North American Aviation's Aerophysics Laboratory.

get ready with CONE for tomorrow

Goodyear Tire and Rubber Co. cements automobile brake linings directly to the brake shoes eliminating rivets. More surface is provided and longer wear without scoring results.

be ready with CONE for today

Fibrous insulation composed of pure silica and capable of withstanding 2,000 deg. F. is being made by H. I. Thompson Co. of Los Angeles.

get ready with CONE for tomorrow

Photographic prints produced in a specially equipped automobile immediately after exposure were transmitted by radio to the editor's desk at the NEW YORK DAILY MIRROR eight minutes after the event pictured.

American-La France-Foamite Corp. is making a two-car parking meter which halves the cost of installation.

be ready with CONE for today

Color printing by radio facsimile is now possible with a process called "Colorfax" developed by Finch Telecommunications Inc.

get ready with CONE for tomorrow

The underground gassification of coal for the commercial production of power has been proved feasible by the Alabama Power Co.

be ready with CONE for today

The Automatic Signal Division of Eastern Industries, Inc. has a device for measuring the speed of vehicles in traffic that is based on the reflection of a radio wave from the surface of a moving vehicle.

Pennsylvania Railroad is using a mobile X-ray machine to examine metals in locomotives, cars, rails and other equipment.

get ready with CONE for tomorrow

In California the Bakersfield Machine Co. sells welders' supplies directly from a truck to oil fields, farmers, factories and welding shops.

be ready with CONE for today

American Locomotive Co. has a waste-heat boiler that operates on diesel engine exhaust.

get ready with CONE for tomorrow

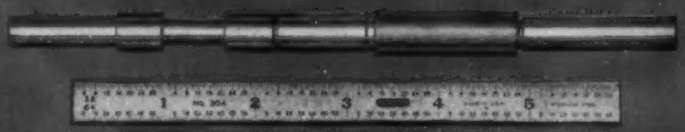
A small air-driven drill made by Aro Equipment Corp. has a ¼-inch chuck and turns 26,000 r.p.m.

be ready with CONE for today

Fruehauf Trailer Co. is making prefabricated truck bodies that can be assembled by the dealer in a few hours.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

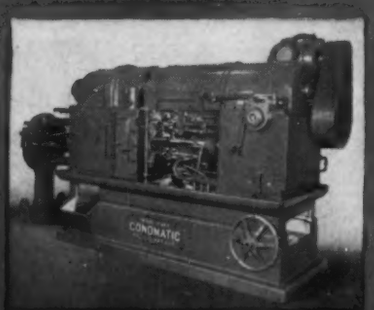
Can YOU equal this



in 12 seconds?

The above shaft was machined by a 1⅝" 8-Spindle Conomatic in 12 secs., with 16 tools, from SAE 1030 — ½" rd. stock.

Ask your CONE representative to show you our new color motion picture



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

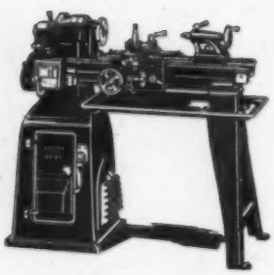
46

YOU CAN'T WIN THE DERBY WITH A PLOW-HORSE

And using heavy machine tools for light, fast jobs is just as inappropriate. Your production costs just can't stay in the running when this is done. Yet, the mismatching of machines and jobs is common.

You should investigate South Bend Lathes if you are machining small, precision parts. This is the type of work for which they are built. Their speed of operation and ease of handling make possible fast machining. Their precision speeds close tolerance work. And the fine finishes they produce often eliminate additional operations.

Use South Bend Lathes for low-cost machining of small parts . . . and put the production "plow-horses" back on the jobs for which they were intended. Write for Catalog 100-F.



10" Quick Change Gear Lathe

South Bend Quick Change Gear and Toolroom Lathes are made with 9" to 16" swings. Precision Turret Lathes with ½ inch and 1 inch collet capacities.

SOUTH BEND LATHE WORKS

419 EAST MADISON STREET • SOUTH BEND 22, INDIANA

BUILDING BETTER LATHES SINCE 1906

NORBIDE* INSERT IN ANVIL

Eliminates Necessity for Lapping

Here is a typical example of how molded NORBIDE shapes are cutting gage costs. A Flat NORBIDE piece has been inserted in the anvil at a point where the greatest wear will occur. Field reports indicate that many NORBIDE inserts have been in constant use for over a year, with no attention having been given them, other than for inspection. Less wear-resistant anvils, on the other hand, usually have to be relapped to be kept in condition.

NORBIDE is the Trade Mark for NORTON BORON Carbide, the hardest material made by man. NORBIDE has had wide and successful use as wear-resistant parts for a variety of measuring devices. If your regular supplier does not have all the information about NORBIDE Gages, *please write us.*

NORTON COMPANY **Worcester 6, Massachusetts**

NORBIDE* – The Hardest Material Made by Man

NORTON BORON CARBIDE

* *Trade-mark Reg. U S. Pat. Off*

GISHOLT'S

Hardened steel bed ways are one of the greatest contributions ever made to precision machining on a turret lathe

GISHOLT TURRET LATHES give you precision that *lasts!* All load-bearing, guiding, gibbing, and clamping surfaces are 64-66 Rockwell C—automatically lubricated—virtually wear-proof. Write for literature.

GISHOLT MACHINE COMPANY, *Madison 3, Wisconsin*

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

turret lathes · automatic lathes · superfinishers · balancers · special machines

A COMBINATION THAT'S *hard to beat!*

CLE-FORGE HIGH SPEED DRILLS *and* PEERLESS HIGH SPEED REAMERS

● Here's how to get both *speed* and *accuracy* . . . at the lowest possible cost. CLE-FORGE High Speed Drills have long been famous for fast cutting. PEERLESS High Speed Adjustable Reamers are widely known for dependable accuracy. Both will save you money because they produce *more holes per grind.* The same qualities are engineered into all other CLEVELAND Tools—Screw Extractors, Arbors, Mandrels, Sockets, Mills, Counterbores, and MO-MAX High Speed Ground Tool Bits and Cut-off Blades.

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The CLEVELAND TWIST DRILL COMPANY
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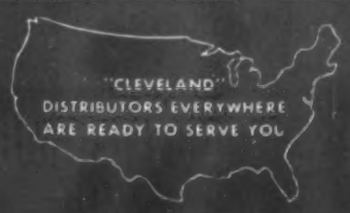
G. P. BARROW, LTD., BOUNDS RD., ACTON, LONDON, W. 3, ENGLAND



The DeVlieg JIGMIL is now recognized as The World's Leader in the field of accurate boring, in addition to its unique capacity for high productivity on:

1. **Single part precision boring.**
2. **Tool, jig and die work.**
3. **Repetitive production work without jigs.**

Write today for new descriptive booklet.

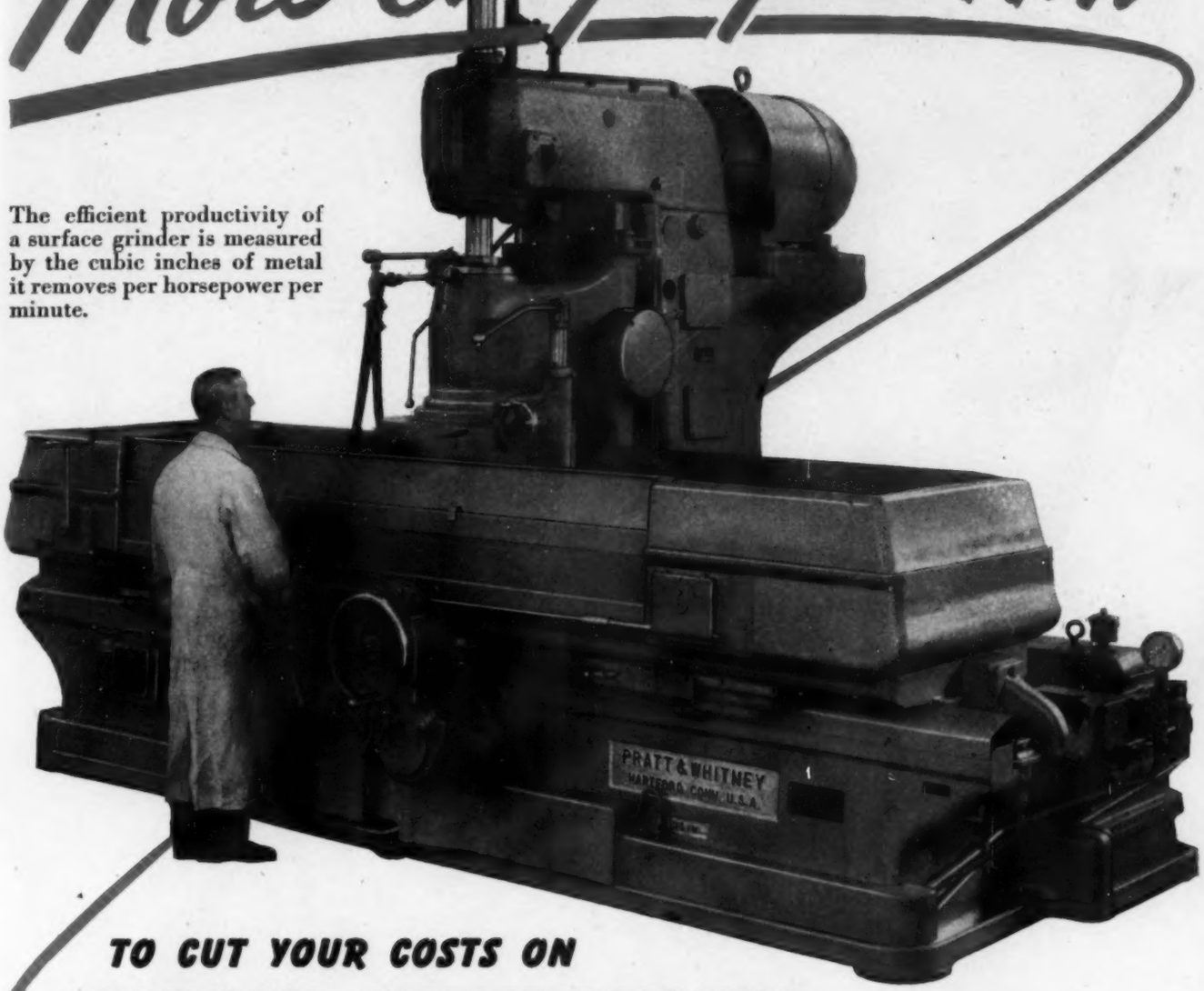
DEVLIEG JIGMIL

DeVLIEG MACHINE COMPANY

450 FAIR AVE., FERNDALE 20, (DETROIT) MICH.

More Chips per H.P.

The efficient productivity of a surface grinder is measured by the cubic inches of metal it removes per horsepower per minute.



TO CUT YOUR COSTS ON HEAVY-DUTY SURFACE GRINDING

This P&W Heavy-Duty Hydraulic Vertical Surface Grinder has all the requisites for efficient productivity. It will remove metal at the *highest rate* and at the *lowest cost* per horsepower per cubic inch. It has ample power (100 H.P.) needed to give the 30″ grinding wheel its full chance to cut, either roughing or finishing, without slowing down from full efficient cutting speed. It has ample, smooth, hydraulic power (15 H.P.) to drive the work past the wheel . . . with the *edge* of the wheel doing the cutting. The table speed is always *right* for the job. The machine is heavy and rigid (19 tons) to hold its built-in accuracy intact under constant heavy-duty service. That's why its users consider this new 30″ Surface Grinder a *paying* investment.

This is the largest of P&W's line of surface grinders . . . all designed the way our many years of research and user contact have proved best. Write today for complete literature.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

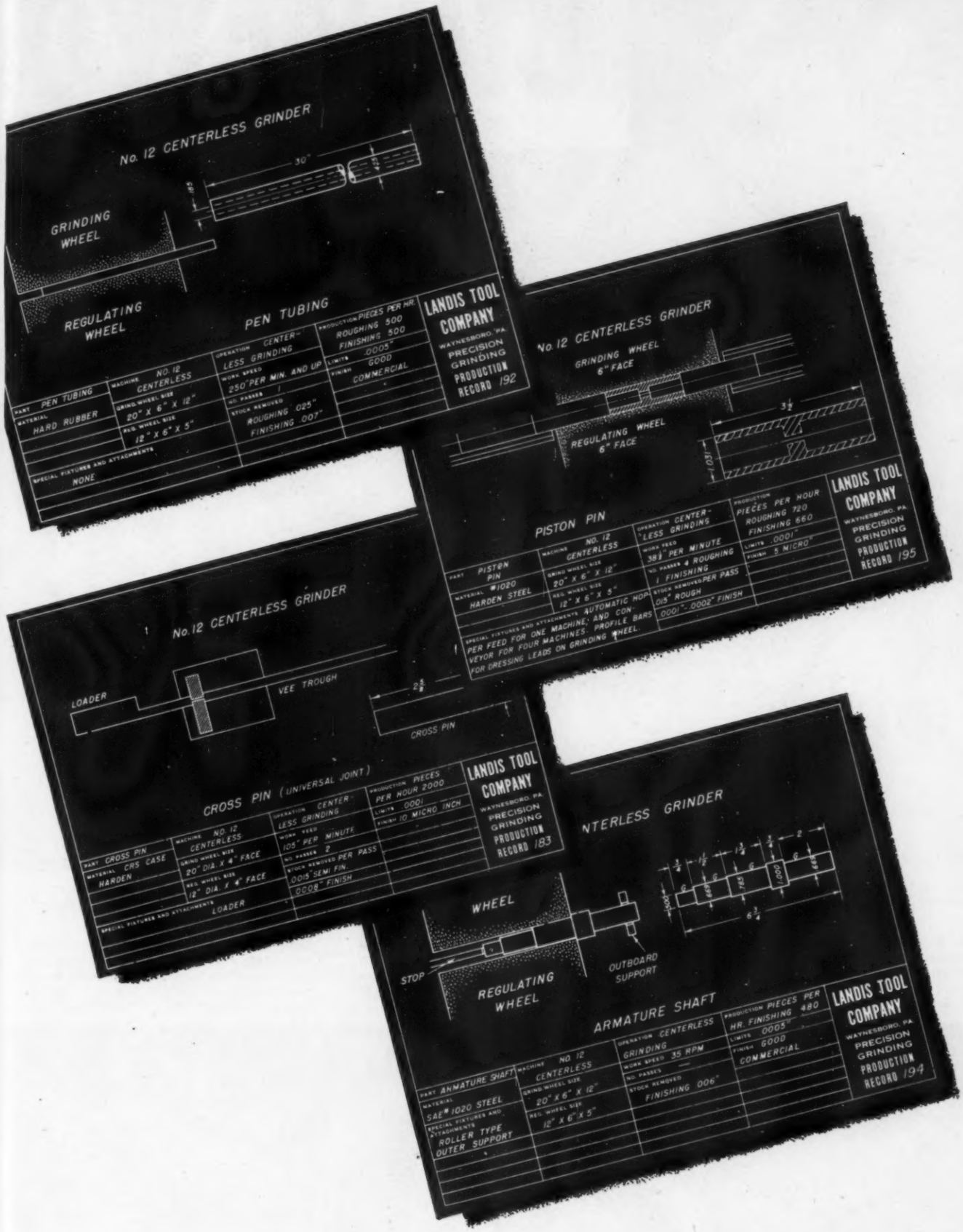
WEST HARTFORD 1, CONNECTICUT

still more

LANDIS TOOL *Precision Grinders*

ask for Catalog T-47

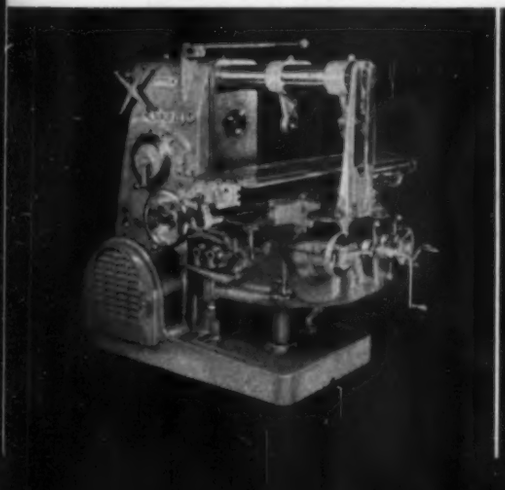
Centerless Grinding Production Records


No. 12 CENTERLESS GRINDER
30"
GRINDING WHEEL
REGULATING WHEEL
PEN TUBING
PART PEN TUBING
MATERIAL HARD RUBBER
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
SPECIAL FIXTURES AND ATTACHMENTS NONE
OPERATION CENTER-LESS GRINDING
WORK SPEED 250" PER MIN. AND UP
NO. PASSES 1
STOCK REMOVED ROUGHING .025" FINISHING .007"
PRODUCTION PIECES PER HR. ROUGHING 500 FINISHING 500
LIMITS .0005"
FINISH GOOD COMMERCIAL
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 192
No. 12 CENTERLESS GRINDER
GRINDING WHEEL 6" FACE
REGULATING WHEEL 6" FACE
3½
1.031
PISTON PIN
PART PISTON PIN
MATERIAL #1020 HARDEN STEEL
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
SPECIAL FIXTURES AND ATTACHMENTS AUTOMATIC HOPPER FEED FOR ONE MACHINE; AND CONVEYOR FOR FOUR MACHINES; PROFILE BARS FOR DRESSING LEADS ON GRINDING WHEEL
OPERATION CENTER-LESS GRINDING
WORK FEED 38" PER MINUTE
NO. PASSES 4 ROUGHING 1 FINISHING
STOCK REMOVED PER PASS .015" ROUGH .0001"-.0002" FINISH
PRODUCTION PIECES PER HOUR ROUGHING 720 FINISHING 660
LIMITS .0001"
FINISH 5 MICRO"
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 195
No. 12 CENTERLESS GRINDER
LOADER
VEE TROUGH
2⅝
CROSS PIN
CROSS PIN (UNIVERSAL JOINT)
PART CROSS PIN
MATERIAL CRS CASE HARDEN
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" DIA. X 4" FACE
REG. WHEEL SIZE 12" DIA. X 4" FACE
SPECIAL FIXTURES AND ATTACHMENTS LOADER
OPERATION CENTER-LESS GRINDING
WORK FEED 105" PER MINUTE
NO. PASSES 2
STOCK REMOVED PER PASS .005" SEMI FIN. .0008" FINISH
PRODUCTION PIECES PER HOUR 2000
LIMITS .0001
FINISH 10 MICRO INCH
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 183
NTERLESS GRINDER
WHEEL
STOP
REGULATING WHEEL
OUTBOARD SUPPORT
ARMATURE SHAFT
PART ARMATURE SHAFT
MATERIAL SAE #1020 STEEL
SPECIAL FIXTURES AND ATTACHMENTS ROLLER TYPE OUTER SUPPORT
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
OPERATION CENTERLESS GRINDING
WORK SPEED 35 RPM
NO. PASSES —
STOCK REMOVED FINISHING .006"
PRODUCTION PIECES PER HR. FINISHING 480
LIMITS .0005"
FINISH GOOD COMMERCIAL
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 194

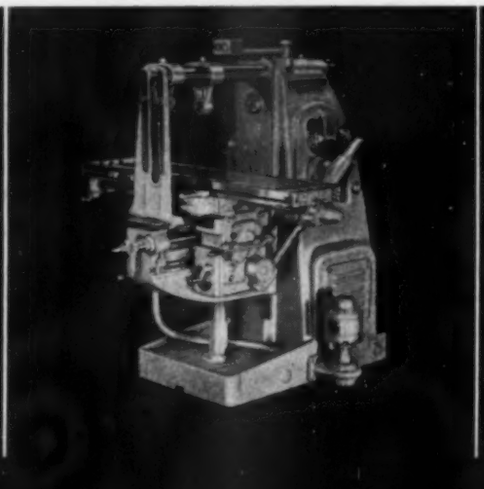
EYE VIEW OF

Kearney & Trecker CSM 20 Automatic Cycle Plain with a carbide cutter removing 14.8 cu. ipm of SAE 1045 steel in one pass! Feed rate: 15¾ ipm. Cutter speed: 235 sfm. Depth of cut: .750 in. Production rate: 60 finished parts per hour.

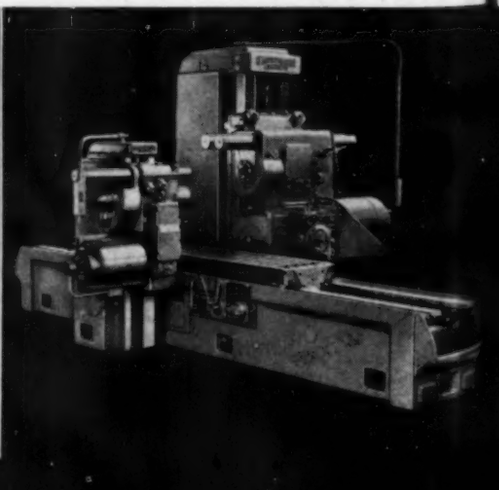
MODEL 2K PLAIN AUTOMATIC CYCLE MILLING MACHINE — The famous Model K machines with Automatic Cycle are available in three sizes and in both Plain and Vertical types.



MODEL E PLAIN MILLING MACHINE —This new simplified milling machine design gives you every fundamental requirement—plus highest dollar for dollar value obtainable anywhere.



NEW DUPLEX BED-TYPE MILLING MACHINE —Kearney & Trecker's new concept of bed-type design. Gives you wide working ranges and horse-power capacities for most effective use of all cutting tools.



PROFITS IN MAKING

New Kearney & Trecker-Milwaukee Automatic Cycle Milling Machine produces a part-a-minute, floor-to-floor time! Reduces operator fatigue and manufacturing costs.

WOULD you like to cut milling costs, get greater operator efficiency with less fatigue, increase production? Here's how you can:

Investigate the new Kearney & Trecker Automatic Cycle Knee-type milling machines — a complete line of 28 different Plain and Vertical models.

What are their advantages? Look at the picture and the job data at the left.

How did the Automatic Cycle feature work on this job? Using a single setup, the operator set his Automatic Cycle stops, started the machine and let it do the rest — rapid traverse to feed position, mill, rapid traverse back to load and unload position and stop. The operator then replaced finished piece with raw stock, tripped the start lever and the machine cycle repeated.

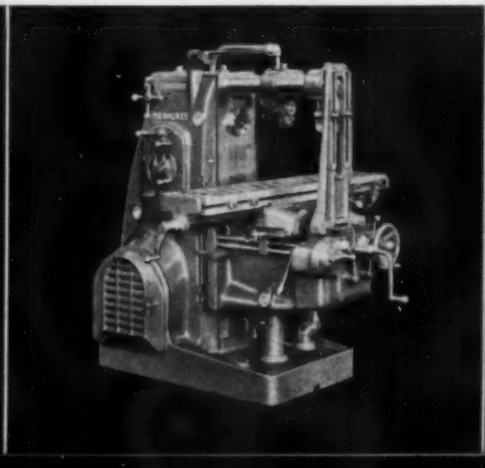
Example shown is a short-run job. On long runs, duplicate set-ups for reciprocal milling can be used, workpieces loaded and unloaded while cuts are being taken. Result: greater savings!

Equally important to you, Kearney & Trecker Automatic Cycle machines can be used as standard Knee-Types on single pieces and very short runs. For full information on these great new machines, write for Catalog AC10. Kearney & Trecker Corporation, Milwaukee 14, Wisconsin.

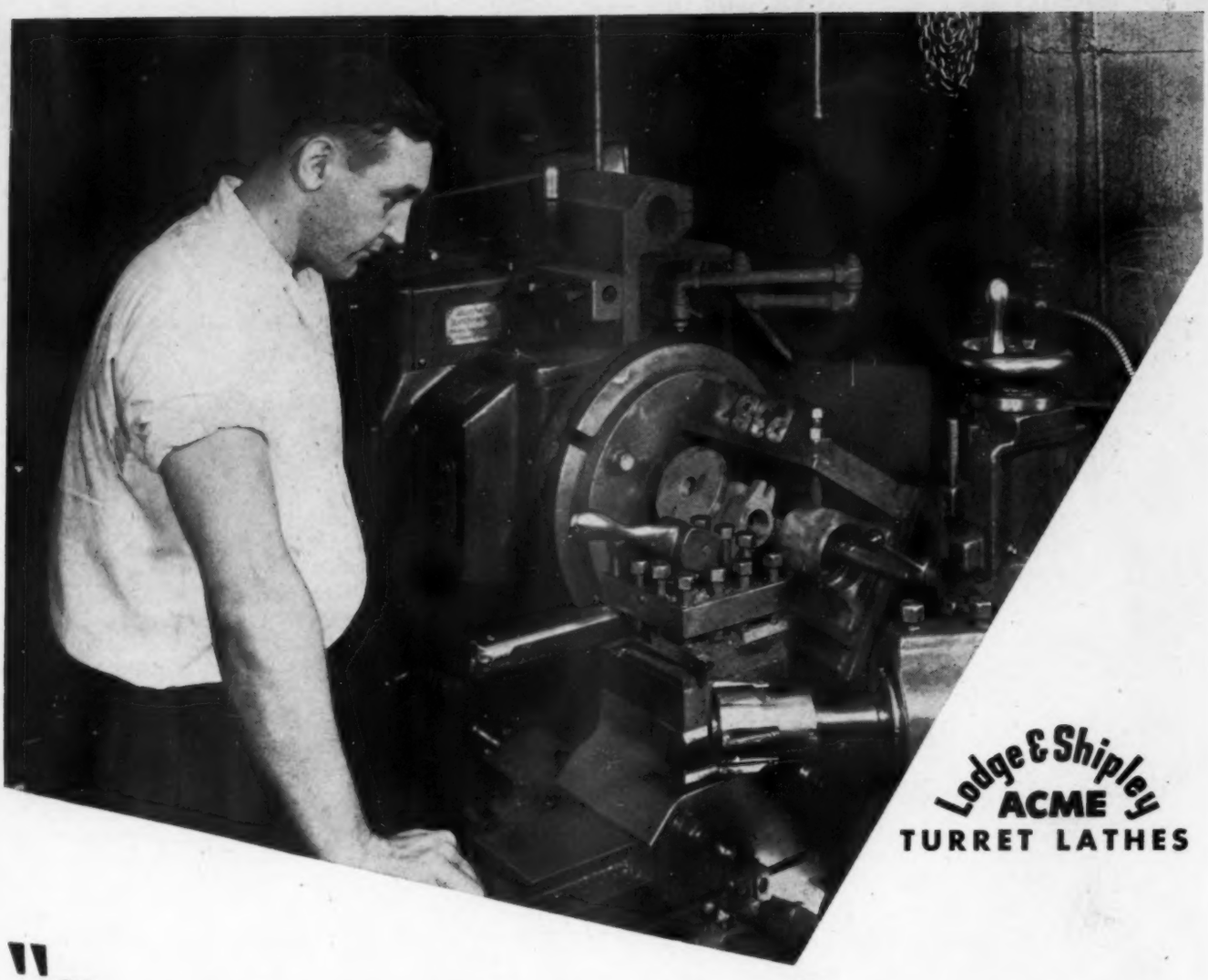
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

MODEL 3K VERTICAL AUTOMATIC CYCLE MILLING MACHINE—New Automatic Cycle feature gives you high production capacity on long run lots — and amazing new ease of control for short runs.

MODEL 2H PLAIN MILLING MACHINE—The most popular size machine ever built. Available in Plain, Universal and Vertical types. Automatic Cycle feature obtainable on either Plain or Vertical types.



MODEL 3C AUTOMETRIC PRECISION BORING MACHINE — Here is the result of nearly a half century of research in precision boring. Built to the most exact standards to produce the most exact results.



"Satisfactory in *every* respect"

• This is the opinion of Robbins & Myers, Inc., Springfield, Ohio, in the use of Lodge & Shipley Acme Turret Lathes. For example, this noted manufacturer of pumps, motors, fans and hoists uses the 5-W Turret Lathe shown to machine the casing for their "Moyno" pump.

• This pump has but a single moving part and must be held to a tolerance of .0003". Performances of Lodge & Shipley Acme Turret Lathes on these and other jobs, caused this user to state: "We like design, operation and maintenance very much . . . getting a first class job."

• Operations on the Lodge & Shipley Acme Way-Type Turret Lathes include boring, facing, forming and reaming with carbide and high speed tools working cast iron, bronze, aluminum bronze and No. 316 stainless steel castings. The parts machined include pump bodies, multi-stage housings, lands, stators and end caps.

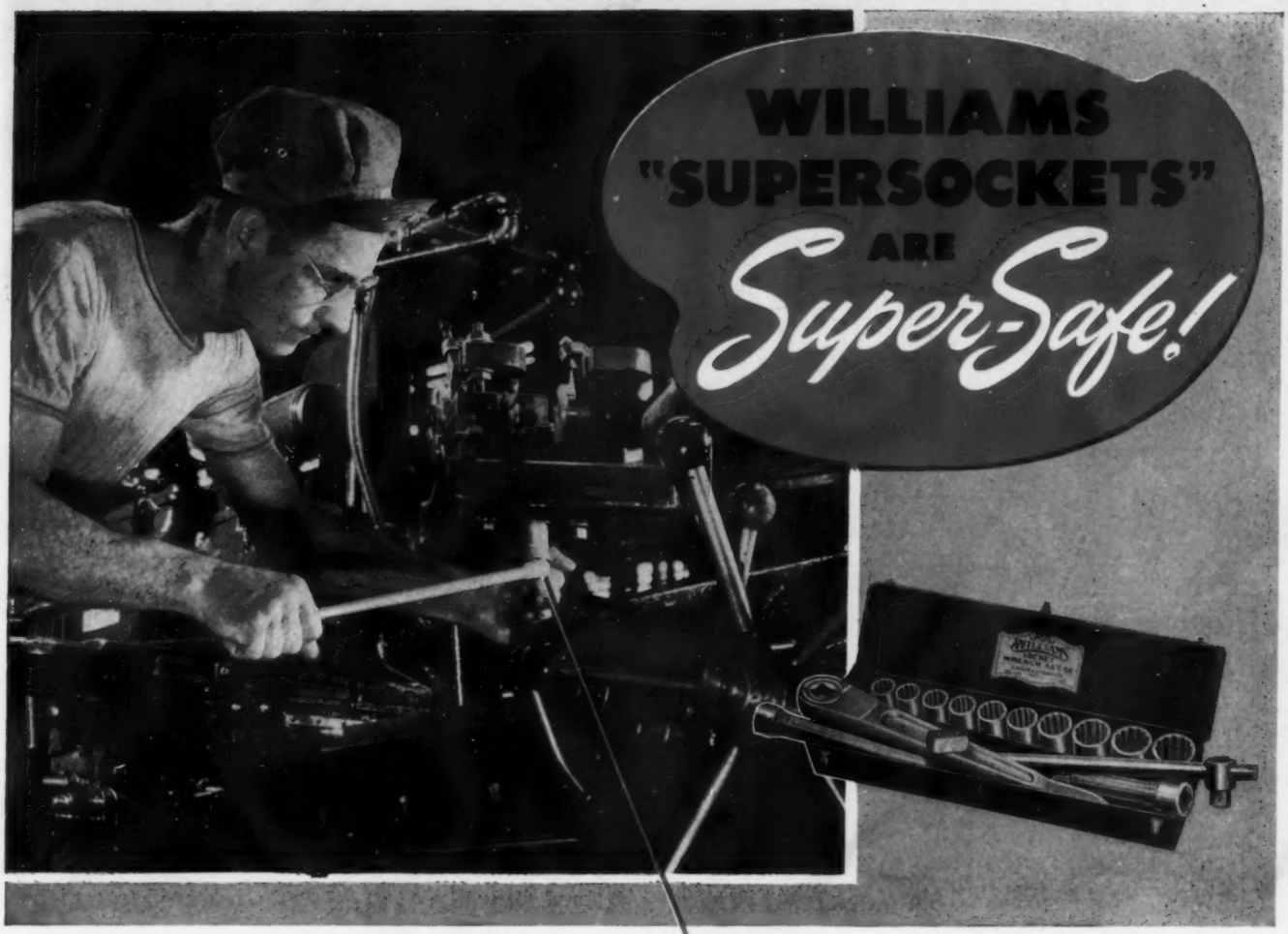
• Your Lodge & Shipley representative will be glad to give you further details on 4-W and 5-W Way-Type Lathes, Ram and Saddle Types in a variety of sizes and capacities. Write for descriptive bulletins.

THE **Lodge & Shipley** COMPANY

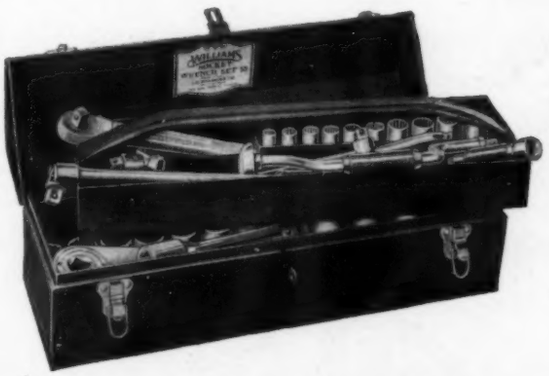
CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.



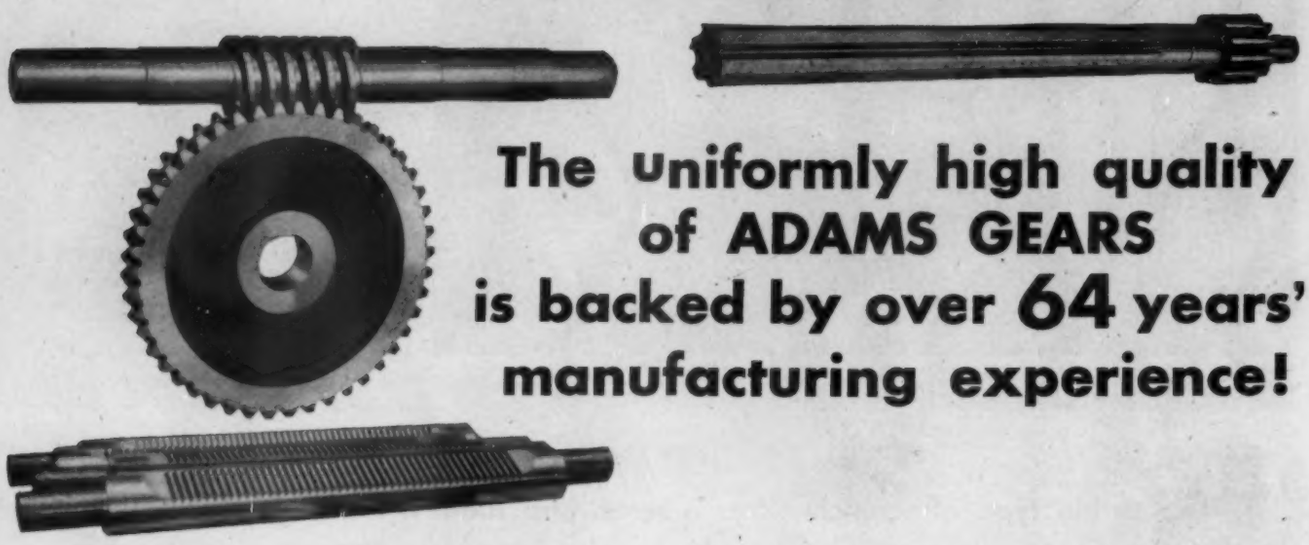
● No type of wrench offers a surer grip than Williams "Supersockets." This operator knows his wrench can't slip although he is unable to see the cap screw he is loosening. He knows he can apply a hard pull without danger of battered hands or more serious injury. He's a safe and efficient worker because he has safe and efficient tools!



And super-safety is only one feature of Williams "Supersockets." With their endless combinations of handles, accessory parts and sockets, they provide industry's most flexible wrench system. Made in five patterns, with drives from 1/4" to 1" square. Sold by leading Industrial Distributors everywhere.

J. H. WILLIAMS & CO., BUFFALO 7, N. Y.

WILLIAMS
DROP-FORGINGS AND
DROP-FORGED TOOLS



The uniformly high quality of ADAMS GEARS is backed by over 64 years' manufacturing experience!

SPUR GEARS	RACKS
HELICAL GEARS	LEAD AND FEED SCREWS
BEVEL AND MITER GEARS	GROUND TOOTH GEARS (Spur and Helical)
WORMS AND WORM GEARS	SHAVED TOOTH GEARS (Spur and Helical)
SPROCKETS	GROUND THREAD WORMS
INTERNAL GEARS (Spur and Helical)	
RATCHETS	
SPLINED SHAFTS	

EXPERIENCE is an important factor in the selection of a source of gears. Here at Adams we have had long experience both as a user of gears and as a manufacturer of gears. This experience is backed up by skilled workmen and the most modern gear producing equipment. Take advantage of these facilities the next time you need gears. THE ADAMS COMPANY, 1942 Bridge Street, Dubuque, Iowa.

The ADAMS Compa

Dubuque, Iowa, U. S. A.

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS . . . ESTABLISHED 1883

Spring Engineering

makes the difference!

If you use springs, you can profit from the moral the illustration points out. The secret to top notch spring performance lies in good spring engineering.

That's why so many spring users install American Quality Springs in their products.

These superior springs have been engineered to resist fatigue . . . hold their shape with unusual success . . . give long and faithful service.

Included in our line of springs is every type and size of compression, extension, torsion and flat spring in common use.

Our unexcelled production facilities mean that you can usually count on speedy delivery of American Quality Springs in whatever quantity you want.

Whether you buy springs ready-made or make them yourself, bring your spring problems to us. Our experts will see to it that you are supplied either with exactly the right springs for your job, or with the best spring wire obtainable for making your own springs.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco,
Pacific Coast Distributors

Tennessee Coal, Iron & Railroad Company, Birmingham,
Southern Distributors

United States Steel Export Company, New York

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY
USS
AMERICAN SPRINGS
UNITED STATES STEEL

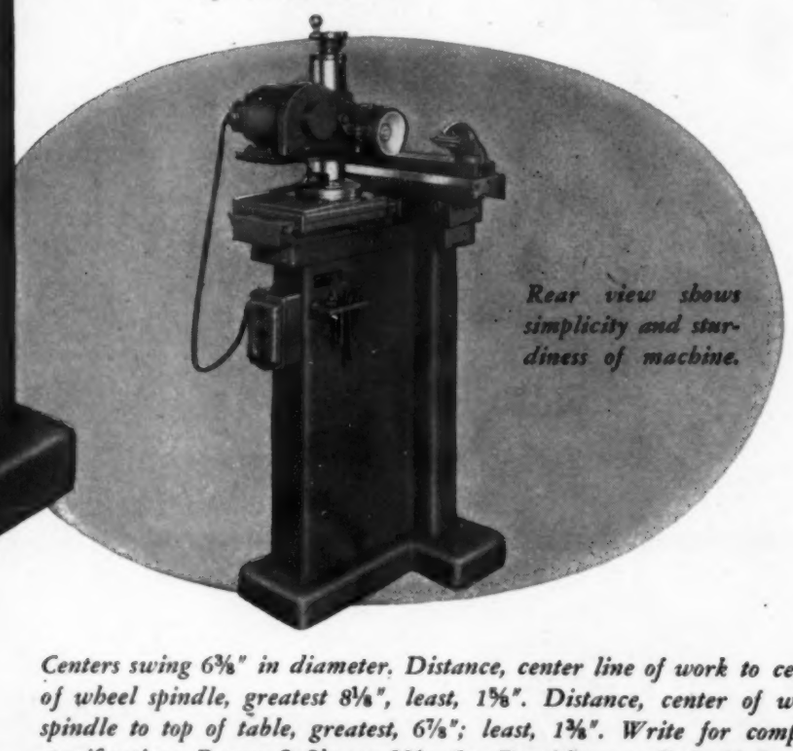
U·S·S American Quality Springs

DEVELOPED TO SAVE YOU MONEY

THE NEW No. 5 CUTTER AND TOOL GRINDING MACHINE

UNIQUE FEATURES

- ✓ **Double-ended ball bearing wheel spindle (super-precision, permanently-sealed, grease-lubricated bearings).**
- ✓ **Ingenious, roller-bearing table.**
- ✓ **4-location table crank or knob.**
- ✓ **Hollow, one-piece base, mounted on 3 points to preserve alignment.**
- ✓ **Additional equipment: Indexing equipment; Raising Blocks; Formed Cutter Sharpening Equipment; Collets for No. 5 & No. 7 B & S Taper Shanks; Draw-in Bolt; 3/8" and 3/4" Cutter Bars.**



Rear view shows simplicity and sturdiness of machine.

Centers swing 6 3/8" in diameter. Distance, center line of work to center of wheel spindle, greatest 8 1/8", least, 1 5/8". Distance, center of wheel spindle to top of table, greatest, 6 7/8"; least, 1 3/8". Write for complete specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN &

Y ON CUTTER AND TOOL GRINDING

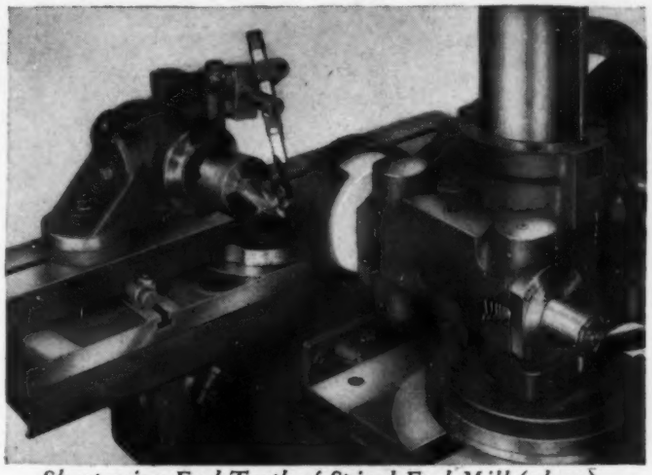
NEW OPPORTUNITIES

are now available for important improvements in your tool room efficiency through the compact, versatile and extremely sensitive Brown & Sharpe No. 5 Cutter and Tool Grinding Machine. It is specifically designed to handle a large share of tool room sharpening jobs . . . all types of small cutters, especially end mills . . . also reamers and similar tools. Handy in size and unusually flexible, it simplifies and speeds up cutter and tool sharpening.

Easy-gliding, roller-bearing table makes operation extremely simple and accurate.

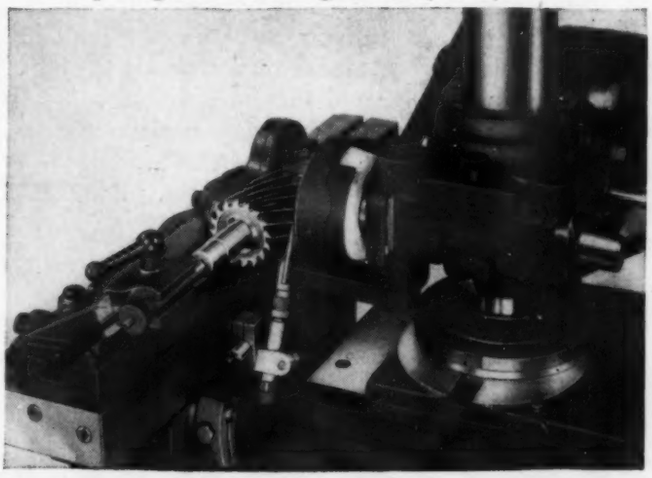
✓ SAVE ON SET-UPS AND OPERATION

The super-sensitive operation of this No. 5 machine . . . readily responsive to a light touch from the operator . . . makes set-ups and operation fast and easy. It is the result of an ingeniously-designed table which slides on 36 precision-ground rolls . . . plus lighter weight parts, engineered for fast and accurate sharpening. Most desirable work center height, conveniently located controls, and small machine size also facilitate set-ups and operation.



Sharpening End Teeth of Spiral End Mill (above).

Sharpening Plain Milling Cutter (below).



✓ SAVE ON FLOOR SPACE AND INVESTMENT

For a moderate investment, the No. 5 Machine will do much of the work that has been done frequently on larger, more expensive machines. On the basis of smaller overhead and space alone, it will reduce the unit cost of sharpening many cutters and tools.

SHARPE B·S

Speed cutting-off Service

Crucible Steel Started Something

11 years ago Crucible Steel Company's Chicago warehouse started something when they installed their first MARVEL Saws to give fast service on "cut to size" orders. Today, 9 Crucible Steel Company warehouses are equipped with MARVEL Saws, can deliver on short notice accurately cut-off lengths or slices from even the largest bars and billets, or literally thousands of identical pieces automatically cut-off at terrific speed from single or nested bars.

The above picture of the new cutting-off department in Chicago shows two No. 18 MARVEL Giant Hydraulic Saws (capacity 18″ x 18″) and two No. 9A MARVEL Automatic Production Saws (capacity 10″ x 10″).

There are MARVEL-equipped Crucible Steel Company warehouses in:

CHICAGO
INDIANAPOLIS
ST. LOUIS
CLEVELAND
DETROIT
DENVER
NEW YORK
PHILADELPHIA
BOSTON
PITTSBURGH

SAWING DEPT.
ONE 18" X 18" MACHINE
ONE 18" X 22" MACHINE
THREE 10" X 10" MACHINES
ONE BAND SAW
WITH THIS EQUIPMENT WE CAN CUT YOUR ORDER THE SAME DAY RECEIVED.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago 39, U. S. A.

MARVEL *Metal Cutting* **SAWS**
Better Machines-Better Blades

"Which Squirrel-Cage Motor Shall I Buy?"

Open-Type? This general-purpose squirrel-cage motor meets about 9 out of every 10 application requirements; so chances are it's the design you'll select. Allis-Chalmers builds generously proportioned, rugged *open-type* squirrel-cage motors in sizes from 1 hp to the largest practical requirement.

Splash-Proof? Where operating conditions are conducive to entrance of particles or liquids into ordinary motors from either top or sides, Allis-Chalmers *splash-proof* squirrel-cage motors may be your best buy. They're designed to *exclude* top or side directed particles and liquids. Sizes 1 hp to the largest.

Vertical? or Flange-Type? *Either* can solve a space problem. *Vertical* motors (sizes 1 hp to largest) for vertical drives. *Flange-mounted* for side or angle drives. In both types bearings and closures are designed to prevent grease escapement. Mounting flange for attaching to your base can be provided.

Totally-Enclosed? Explosion-Proof? Completely weather-proof and fan-cooled, these motors are built to beat abrasive dust, dirt and corrosive fumes, or moisture conditions that cause windings in ordinary motors to deteriorate. *Explosion-proof type* for oil refineries, paint, varnish or lacquer plants, etc.; Underwriters approved; reduce hazards in explosive or dust atmospheres. Either type built from 1 hp and up.

Are Motor Decisions More Important Today?

YOU BET THEY ARE! One *obvious* reason is the need for keeping costs down. Another is that in the rush to fill demand much equipment is being misapplied; making it harder to maintain profits not alone today, but tomorrow, the next day and the next year—as long as misapplication continues!

That's why it's important to take a good look at motors — their characteristics — your equipment — power source and surroundings — *before* you buy and apply! If you're in doubt, don't take chances — call a motor expert! ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2327

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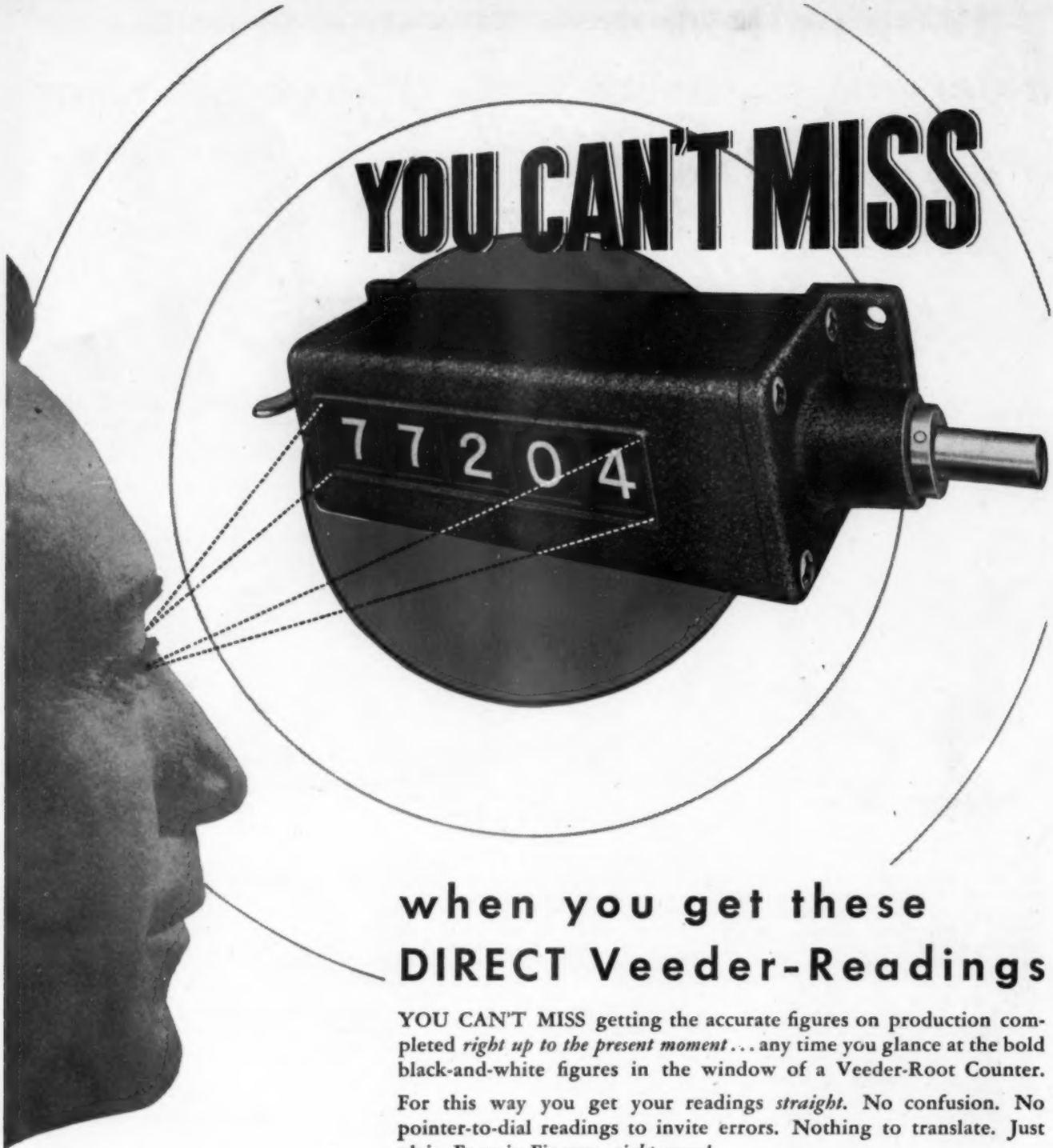
A CENTURY OF SERVICE
to Industry
THAT MADE America Great

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment-
Biggest of All in Range of Industrial Products



when you get these DIRECT Veeder-Readings

YOU CAN'T MISS getting the accurate figures on production completed *right up to the present moment*... any time you glance at the bold black-and-white figures in the window of a Veeder-Root Counter.

For this way you get your readings *straight.* No confusion. No pointer-to-dial readings to invite errors. Nothing to translate. Just plain Facts-in-Figures, *right now!*

There are Veeder-Root Devices, mechanically and electrically operated, to put everything under *Count*rol, including whatever unit or motion *you* want to count. They can be built into products to increase their utility and sales... and they can be easily attached to machines now in use. In fact, you can even have your Veeder-Readings *flashed* from factory to office, if you wish. How? It's easier to *show* you and we'll be glad to do just that. Write.

VEEDER-ROOT Inc.

HARTFORD 2, CONNECTICUT

In Canada: Veeder-Root of Canada, Ltd., 955 St. James St., Montreal 3.

In England: Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey.

28-spindle Modern Tapping Machine maintains precision with Timken bearings

TAPPING as many as 28 holes in one operation, this Modern Tool Works Ltd. 5-way tapping machine has spindles mounted on Timken tapered roller bearings to insure long-lasting precision.

Timken roller bearings hold spindles rigid, yet free to rotate easily. Due to the line contact between the rolls and races, the spindle is supported over a large part of its length . . . no chance of deflection. Because of the Timken tapered construction and provision for take-up in assembly, there is no possibility of end-movement. And the true-rolling motion and incredibly smooth surfaces of Timken bearings practically eliminate friction.

Made of Timken fine alloy steel, Timken bearings are selected to last the life of the machine. Bearing wear is negligible; spindles *keep* their precision for long years of service.

No other bearing can give you *all* the advantages you get with Timken bearings — backed by 49 years of research and development. Make sure the trade-mark "Timken" is on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN BEARING EQUIPPED

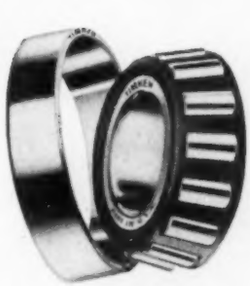
This symbol on a product means its bearings are the best.

WITHIN ONE HALF A THOUSANDTH OF AN INCH! . . . that's an example of the accuracy demanded in the outside diameter of Timken bearing cups in order to pass inspection . . . just one instance of the rigid quality control under which Timken bearings are produced. Timken is the only bearing manufacturer which makes its own steel, and is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ⊣◫⊢ LOADS OR ANY COMBINATION ✳

NIAGA

The modern appearance of these Niagara Presses is significant of the talent and experience responsible for their functional design. Motor, flywheel, clutch and all gears are enclosed within the frame. They are widely used throughout industry.

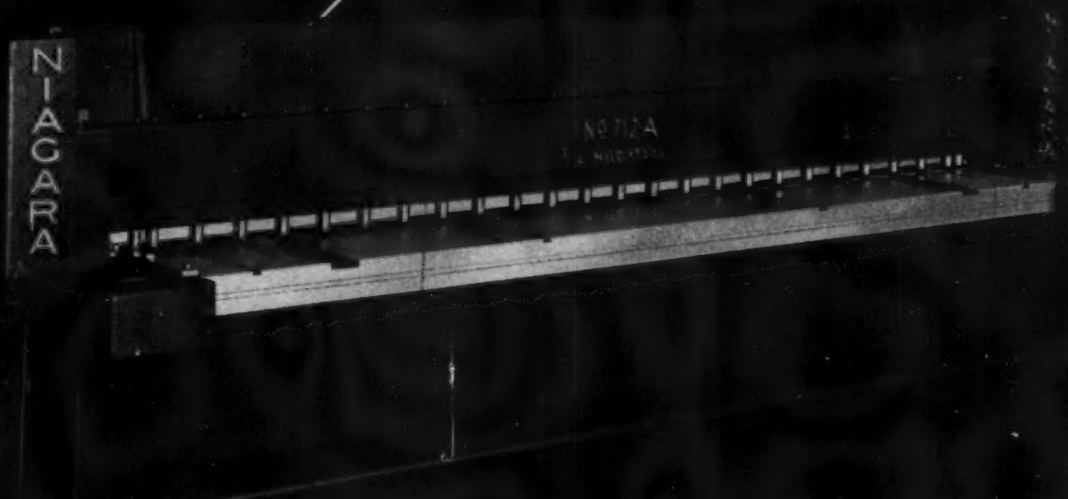
The advanced design of Niagara Underdrive Shears makes possible accuracy plus high output per hour. Strong, rigid bed, crosshead and housings eliminate the necessity for continually adjusting knife clearance for each thickness of sheets. No exposed rotating shafts, eccentrics or belts. Write for bulletins.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, NEW YORK DIS

GARA

PRESSES

SHEARS



DISTRICT OFFICES — NEW YORK • CLEVELAND • DETROIT

Hoot Mon— I really Save with these KEMPSMITH Attachments....

KEMPSMITH ARBORS and accessories are available in all popular sizes and types. Adaptable to any make of milling machine with standardized spindle. Write for Arbor Bulletin.

● Yes sir — a small investment in KEMPSMITH Standard Attachments enables you to reduce production milling costs to rock bottom . . . gives you extra profits from a variety of precision jobs such as rack milling, jig boring, oil grooving, die sinking, tang slot milling, etc.

Kempsmith Standard Attachments broaden the scope of your milling machines. Backed by more than a half century of specialized experience building milling machines exclusively, these precision-built attachments result in (1) lower capital investment in machinery (2) saving in set-up time and (3) greater job versatility. Write today for literature.

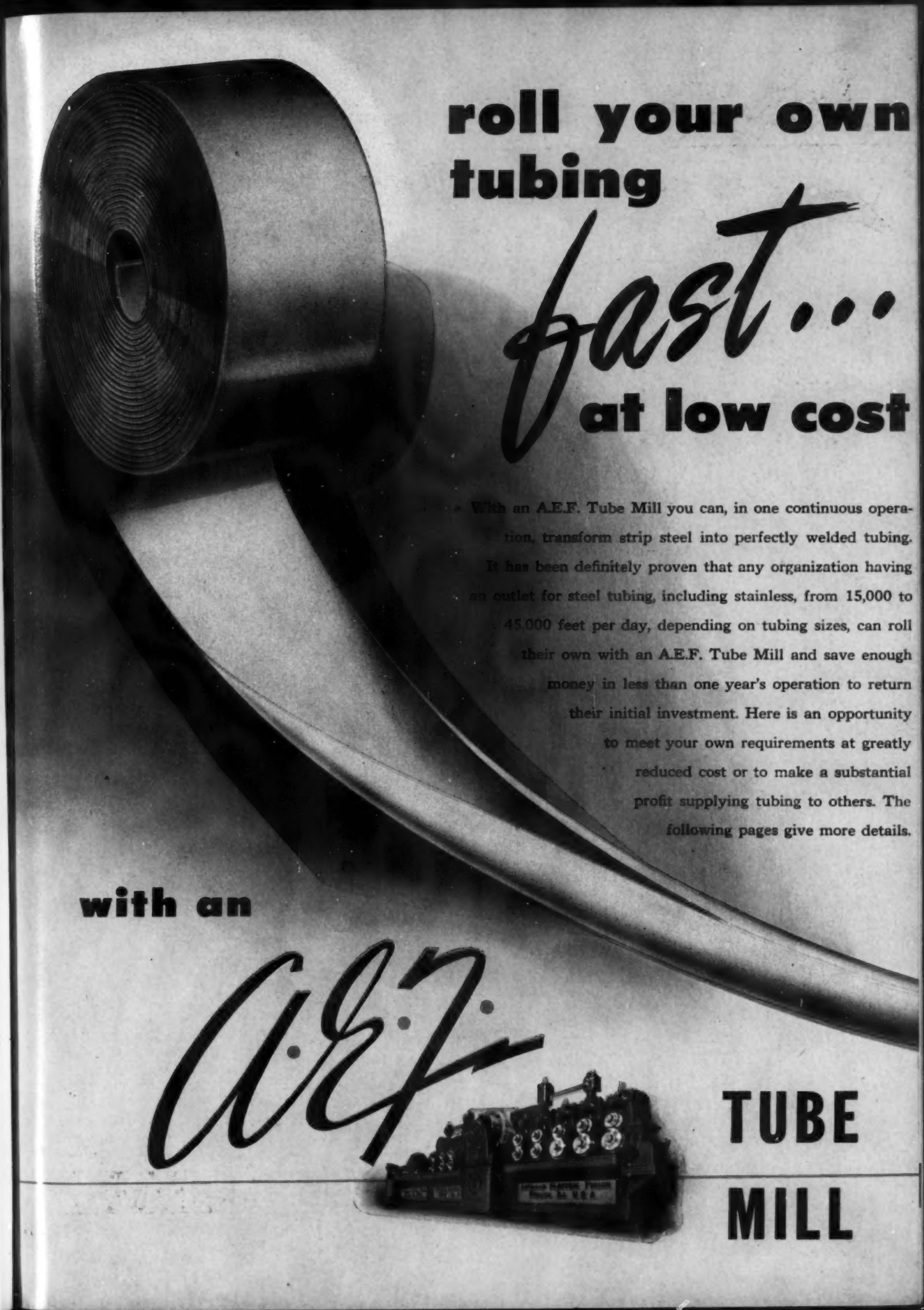
Small Tool Distributors. There is a great demand for Kempsmith Standard Attachments, Arbors and Accessories. Desirable territory still available. Write today for new, liberal selling plan.

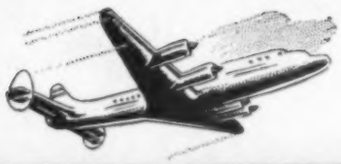
KEMPSMITH MACHINE COMPANY
1823 SOUTH 71ST STREET
MILWAUKEE 14, WISCONSIN, U.S.A.

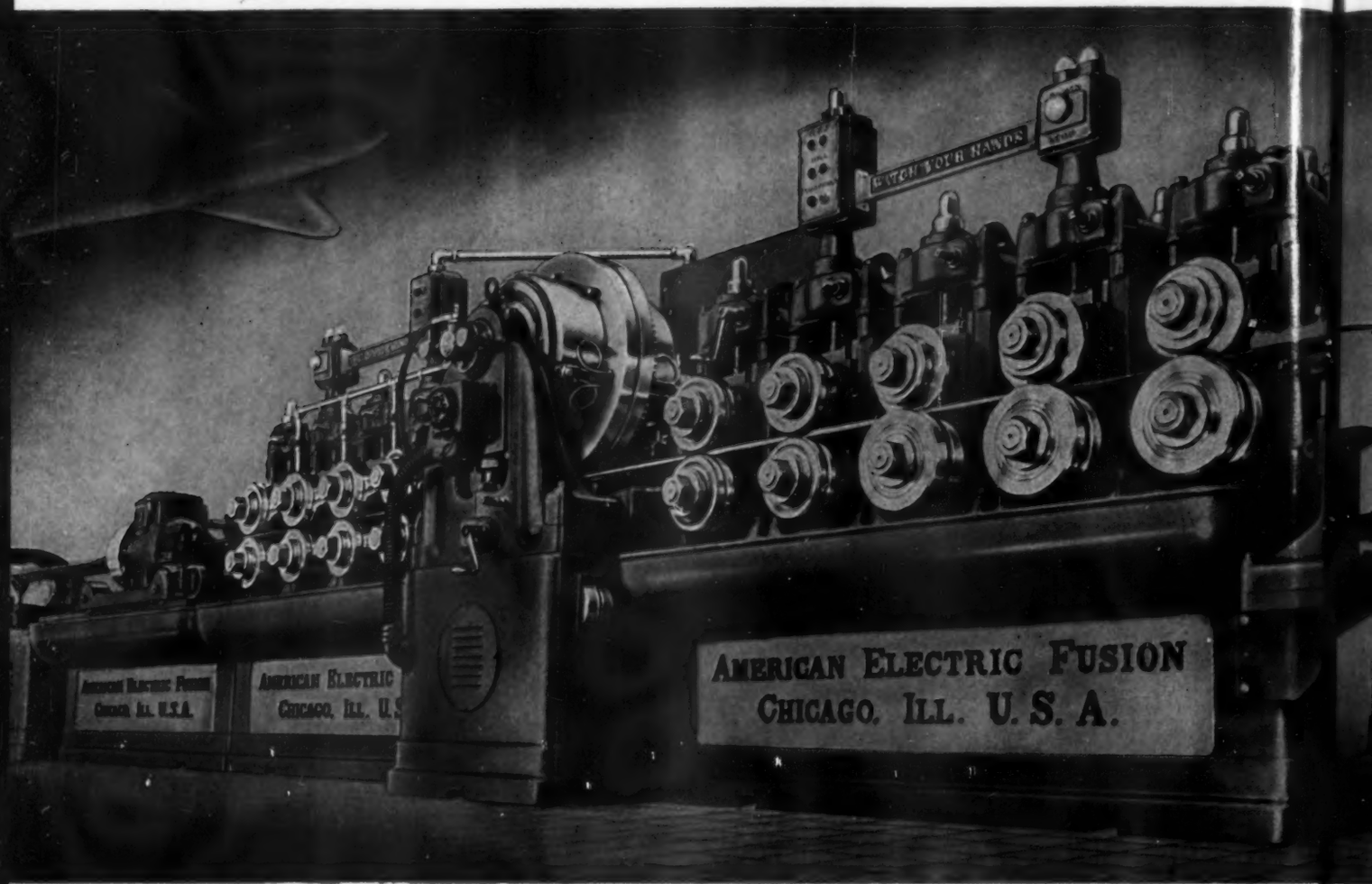
KEMPSMITH

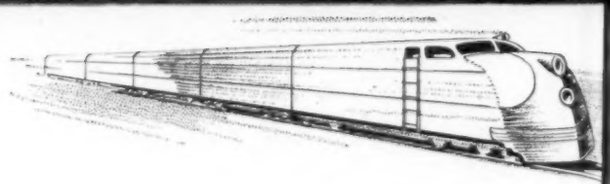
• Precision Built Milling Machines Since 1888 •

A 5304-1PC


roll your own tubing
fast...
at low cost
With an A.E.F. Tube Mill you can, in one continuous operation, transform strip steel into perfectly welded tubing. It has been definitely proven that any organization having an outlet for steel tubing, including stainless, from 15,000 to 45,000 feet per day, depending on tubing sizes, can roll their own with an A.E.F. Tube Mill and save enough money in less than one year's operation to return their initial investment. Here is an opportunity to meet your own requirements at greatly reduced cost or to make a substantial profit supplying tubing to others. The following pages give more details.
with an
A.E.F.
TUBE
MILL





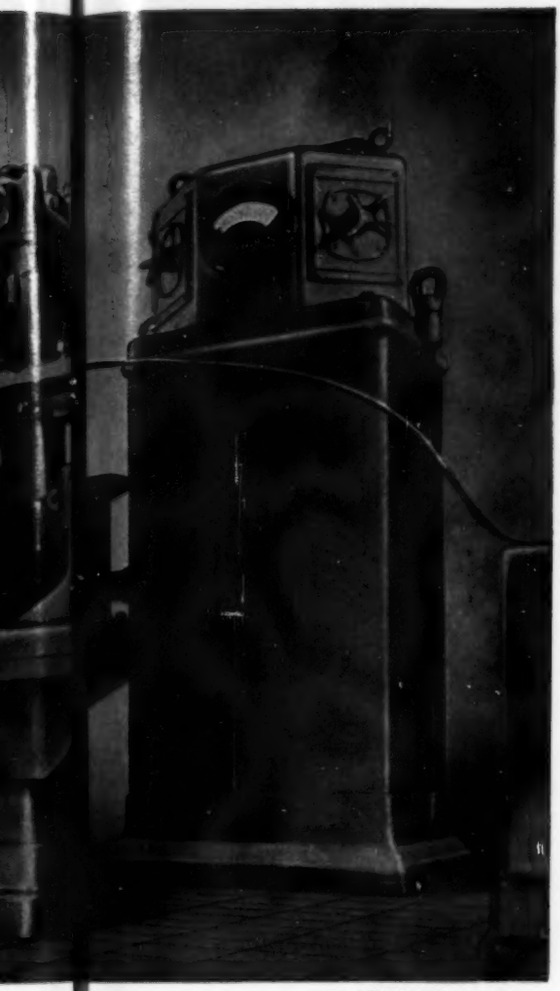


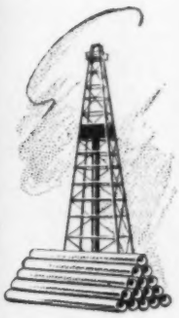
A.E.F.

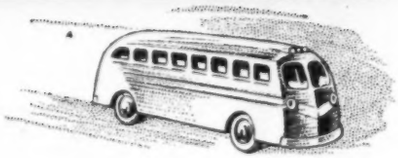
The illustration at the left shows five progressive steps in the forming of flat strip into tubular form on an A.E.F. Tube Mill.

A.E.F. Tube Mills transform strip steel into electrically welded tubing and standard pipe at speeds up to 65 feet per minute, depending on wall thickness and diameter size of tubing. The tubing is formed, welded, scarfed, sized, straightened and cut to length by this machine in one continuous, automatic operation. The finished tubing possesses the same strength and qualities as the original strip from which it was formed. Tubing and pipe can be produced with a low capital investment and a low operating cost per foot due to the minimum amount of labor required to operate such Mills. As a result, A.E.F. Tube Mills are now being used in twelve different countries for producing large quantities of industrial tubing and

. . . AMERICAN

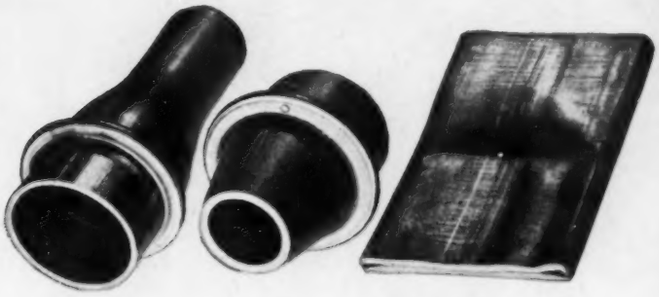






tubing and standard pipe from strip steel!

Below—Tubing made by an A.E.F. Tube Mill may be swaged, drawn, bent, upset, flanged or worked into special shapes without danger of fracture at the welded seams. The illustration shows a piece of tube completely flattened without any fracture of the welded seams.



pipe for such uses as: gas and fluid conveying lines; tubular parts for automobiles, trains, aircraft, farm machinery and industrial equipment; bicycle and furniture frames; structural members for building, construction and industrial requirements; electrical conduit, etc. Reports from users of these mills prove that they have been able to save enough money on tubing to pay for these machines in from thirty-eight days to seven months.

A.E.F. engineers will be glad to discuss fully the mechanics and economics of this equipment with you and are prepared to help you plan and make an A.E.F. Tube Mill installation, put it into operation and train your operators. *Write for literature and information.*

Made in 3 Sizes

1. 60 KVA Light Wall Mill produces tubing with wall thicknesses from .025″ to .093″ and outside diameters from ½″ to 2½″; with slight modification at factory, limits can be extended to make tubing up to 3″ O.D.
2. 170 KVA Medium Wall Mill produces American standard weight pipe from ½″ to 2″, as well as mechanical tubing up to 4″ O.D. with maximum wall thickness of .160″.
3. 300 KVA Heavy Wall Mill produces standard pipe up to 6″ nominal diameter. Detailed information on request.

ELECTRIC FUSION CORPORATION

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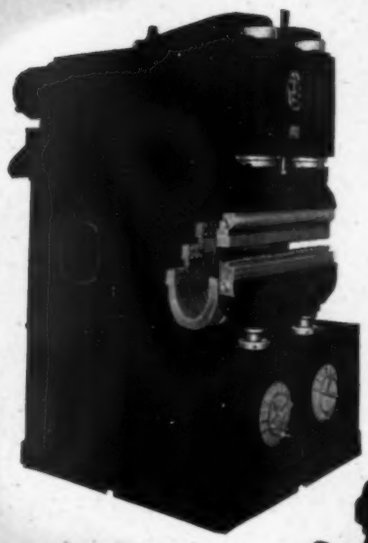
A.E.F. modern products from a modern plant . . .

THE dependability and precision of A.E.F. Tube Mills are due in no small part to the modern plant in which they are produced. The shops are completely air-conditioned, color dynamics have been applied throughout, tools and methods are of the most up-to-date. The facilities and environment are conducive to satisfied, competent employees. The workmanship on A.E.F. equipment reflects this. It is your assurance of a quality product to produce quality work.

A.E.F. Hydraulic Press Welder



A.E.F. Projection Welder

A.E.F. Seam Welder

BY INVITATION
MEMBER OF

NEW YORK U.S.A.

A.E.F. Spot Welder

AMERICAN ELECTRIC FUSION CORPORATION

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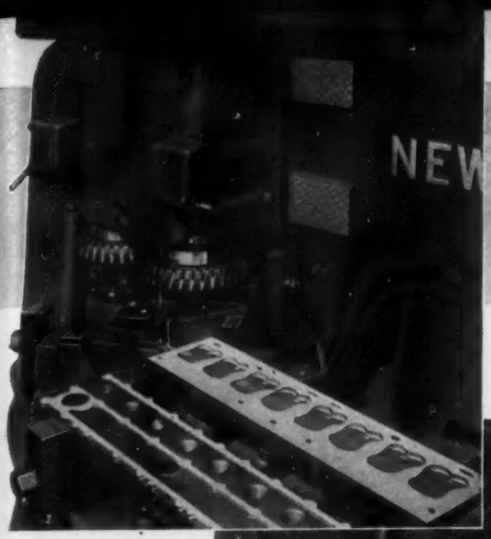
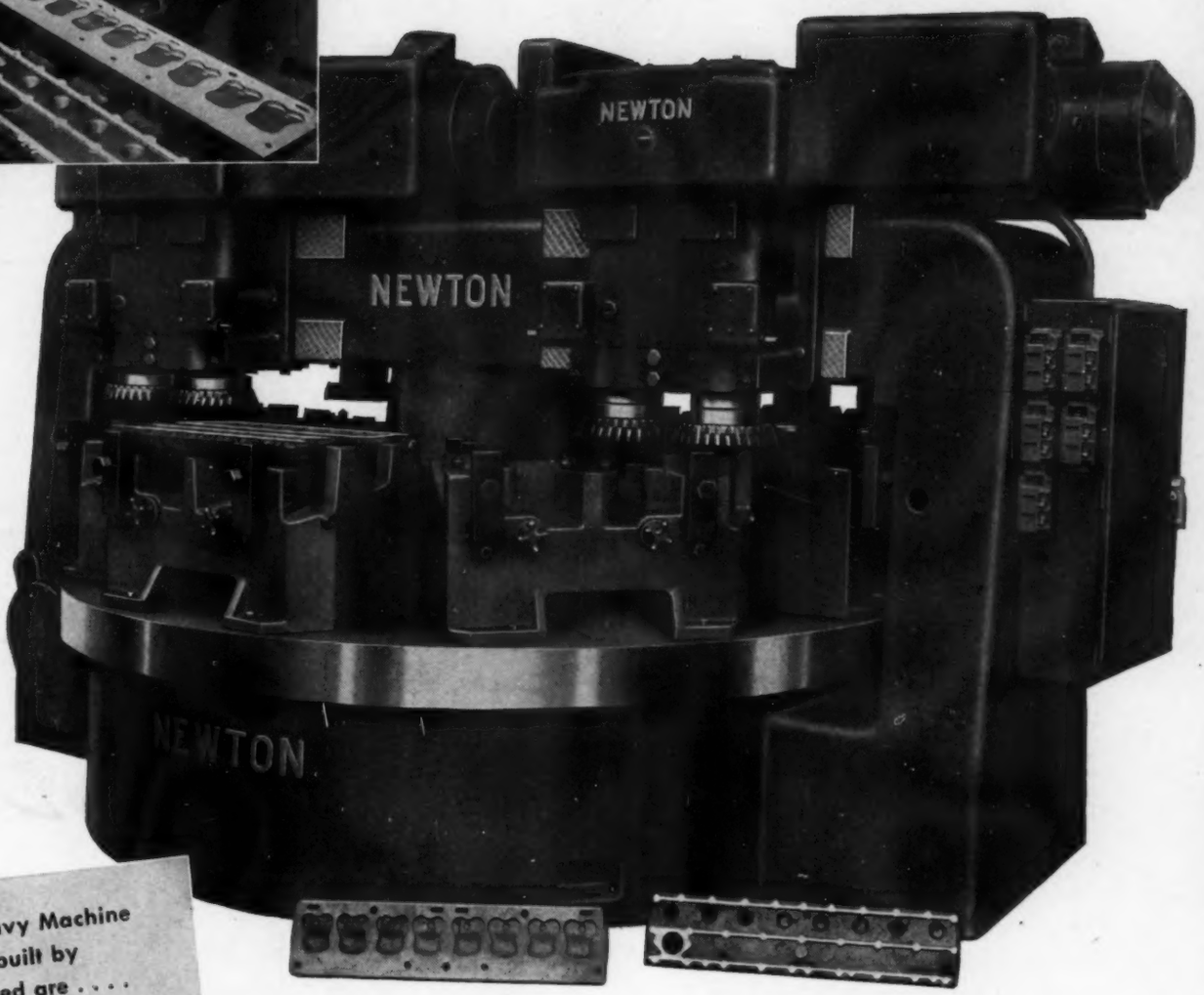


NEWTON EIGHT SPINDLE TWO STATION UNIT HEAD ROTARY CONTINUOUS MILLING MACHINE



Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

Designed for high production milling of automotive cylinder blocks and heads, transmission cases and similar parts, this machine provides new rigidity and power for today's cutting materials. It is equipped with two sets of roughing and two sets of finishing spindles. Operating stations on both sides of the machine make possible twice the productive capacity of the conventional single station machine.

For full information send for Bulletin No. 650

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

How to say "Merry Christmas" in grinding wheel language

Present your management with year-'round savings in your grinding wheel usage.

Such savings would be welcomed by any management—and here's how to do it:

Call in Peninsular Engineers for a study of your grinding. They will analyze your grinding operation completely—your machines, your wheels and the metals you grind.

After this analysis, they will show you how to get greatest results for lowest cost, a Peninsular specialty since 1889. This service costs you nothing, but may save you a lot. You can't afford to overlook it!

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

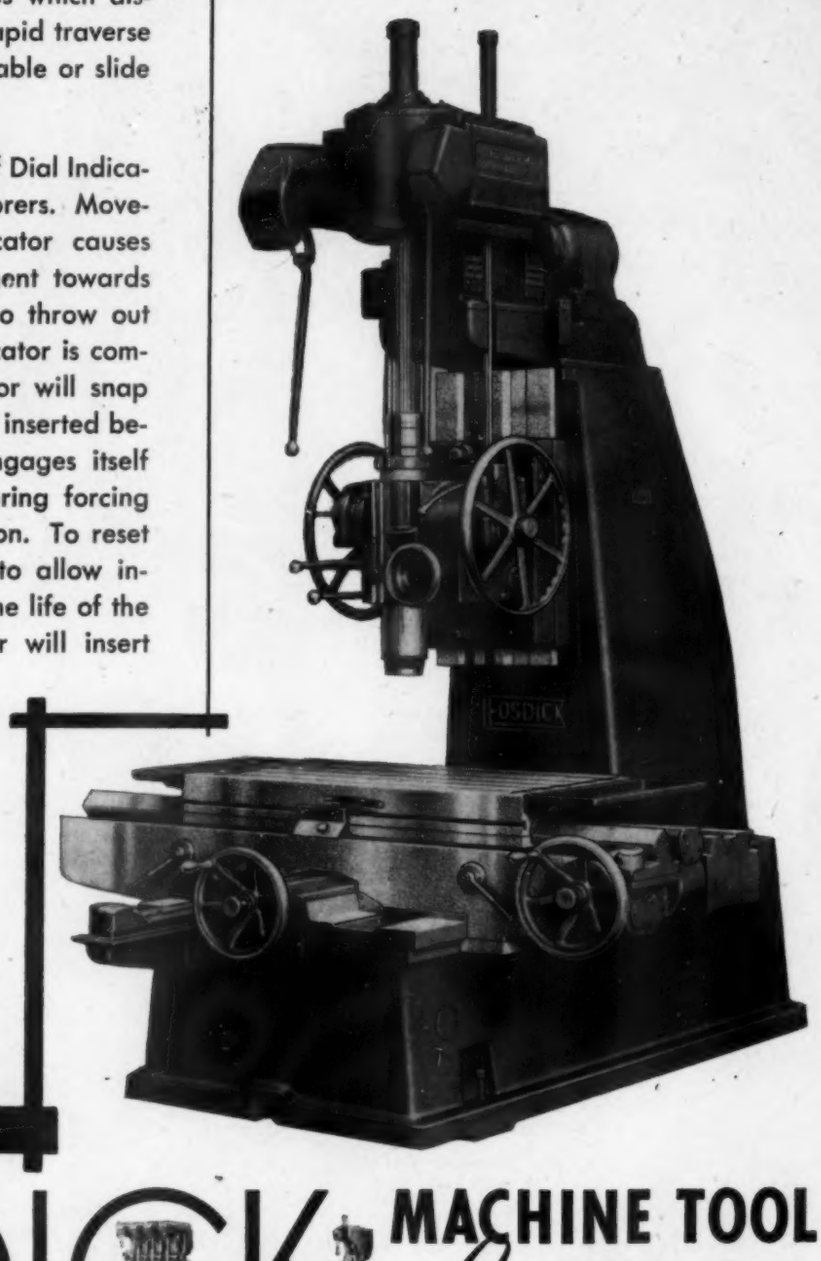
SPECIALISTS IN RESINOID BONDED WHEELS

This Peninsular candle is made of cylinder wheels for rough grinding; the wreath is a wheel used for special automotive grinding; the trees are tapered cup wheels with cylinder wheel trunks.

The New, Improved FOSDICK JIG BORER

● Power Rapid Traverse to both table and slide is now available on Fosdick Jig Borers. This mechanism is so designed that it is impossible to damage either dial indicator or measuring rods. Control lever is connected to electric disconnect switches which disengage the power to traverse motor. Rapid traverse control lever is moved in direction the table or slide is traveling.

Another new development is a fool-proof Dial Indicator Bracket now used on Fosdick Jig Borers. Movement of measuring rods toward indicator causes indicator to unload. Continued movement towards indicator causes an automatic ejector to throw out the measuring rods as soon as dial indicator is completely unloaded and spring in indicator will snap back to its normal position. A plunger is inserted between indicator and trip rod which engages itself and takes up any shock caused by spring forcing indicator stem back to its normal position. To reset indicator, this plunger must be raised to allow indicator to regain its original position. The life of the indicator can be increased if operator will insert plunger and take tension of indicator while machine is idle.

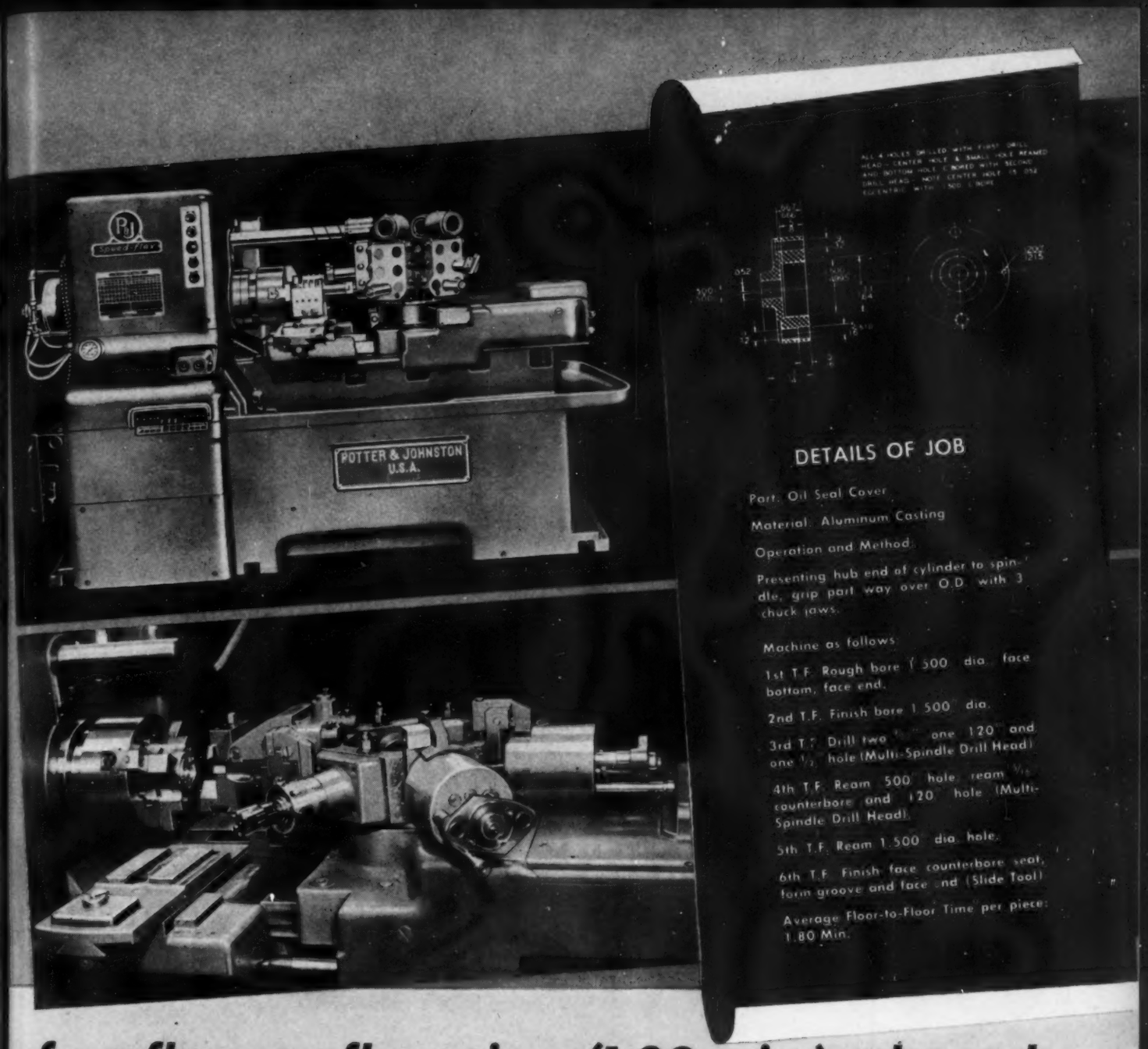


These new features save operators time—facilitate operation of machine—reduce costs.

Check over the many improvements in the Fosdick Jig Borer as described and illustrated in the Jig Borer Bulletin J.B.A.

Write for yours.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO


POTTER & JOHNSTON
U.S.A.
DETAILS OF JOB
Part. Oil Seal Cover
Material. Aluminum Casting
Operation and Method.
Presenting hub end of cylinder to spindle, grip part way over O.D with 3 chuck jaws.
Machine as follows
1st T.F. Rough bore 1.500 dia. face bottom, face end.
2nd T.F. Finish bore 1.500 dia.
3rd T.F. Drill two one 120° and one 1/2" hole (Multi-Spindle Drill Head)
4th T.F. Ream 500 hole, ream counterbore and 120 hole (Multi-Spindle Drill Head).
5th T.F. Ream 1.500 dia. hole.
6th T.F. Finish face counterbore seat, form groove and face end (Slide Tool)
Average Floor-to-Floor Time per piece: 1.80 Min.

...fast floor-to-floor time (1.80 min.)—through putting this job on the...

NEW P&J 3U SPEED-FLEX

Designed particularly for duplicate production of small parts, the P&J 3U Speed-Flex, tooled for the job as shown here, gives an excellent account of itself in both speed and accuracy. Methods engineers will do well to study the special tooling possibilities of this new member of the P&J line of Automatic Turret Lathes because of the outstanding results which can be attained.

The new 3U Speed-Flex will handle the machining of castings and forgings up to 6" diameter. It is fully automatic with the exception for chucking and removal of the finished piece, thereby making it possible for one operator to handle several machines at the same time.

Details of the job illustrated are as follows and typify the kind of performance offered by this new P&J machine. Complete details on the 3U Speed-Flex and on the job itself are available on request.

POTTER & JOHNSTON MACHINE COMPANY

Pioneer Manufacturer of Automatic Turret Lathes

PAWTUCKET • RHODE ISLAND

"UNBRAKO" SOCKET SET SCREW WITH KNURLED CUP POINT

The knurled cup point of this "Unbrako" makes it a Self Locker—the points dig in and hold fast even when subjected to the most shattering vibration.

PAT'D and PATS. PEND.

"UNBRAKO" SOCKET SET SCREW WITH KNURLED THREADS

Knurling the "Unbrako" Socket Set Screw, as shown, swages the threads and an excellent Self-Locker is the result — For use where the points such as: flat, dog, cone and oval do not lend themselves to knurling.

PAT'D AND PATS. PEND.

"FLEXLOC" SELF-LOCKING NUTS

The All-Metal, One-Piece "Flexloc" is a Self-Locking Nut that won't budge, except when a wrench is used. Every thread—takes its share of the load and being a "Stop" nut it will stay locked in any position on a threaded member—"a real fastener", if ever there was one. Free samples.

PAT'D & PATS. PEND.

"HALLOWELL" KEY KIT

PATS. PEND.

You can't tighten or loosen socket screws without a hex socket wrench, so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

KNURLED for quicker assembly

Knurling of Socket Screws originated with "Unbrako" in 1934.

UNBRAKO

Reg. U. S. Pat. Off.

KNURLED SOCKET HEAD CAP SCREWS...assure SLIP and FUMBLE-PROOF GRIP

Because the "Unbrako" Knurled Head Cap Screw provides a slip- and fumble-proof grip, it can be screwed-in faster and farther with the fingers, be they ever so oily, before it becomes necessary to use the slower wrench. The Internal Wrenching feature facilitates compact designs . . . reduces weight and costs. "Unbrako" Knurled Socket Head Cap Screws are available in sizes from #4 to 1½" in diameter and in a full range of lengths. Write for your copy of the "Unbrako" Catalog.

"Unbrako" and "Hallowell" Products are sold entirely through Industrial Distributors.

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

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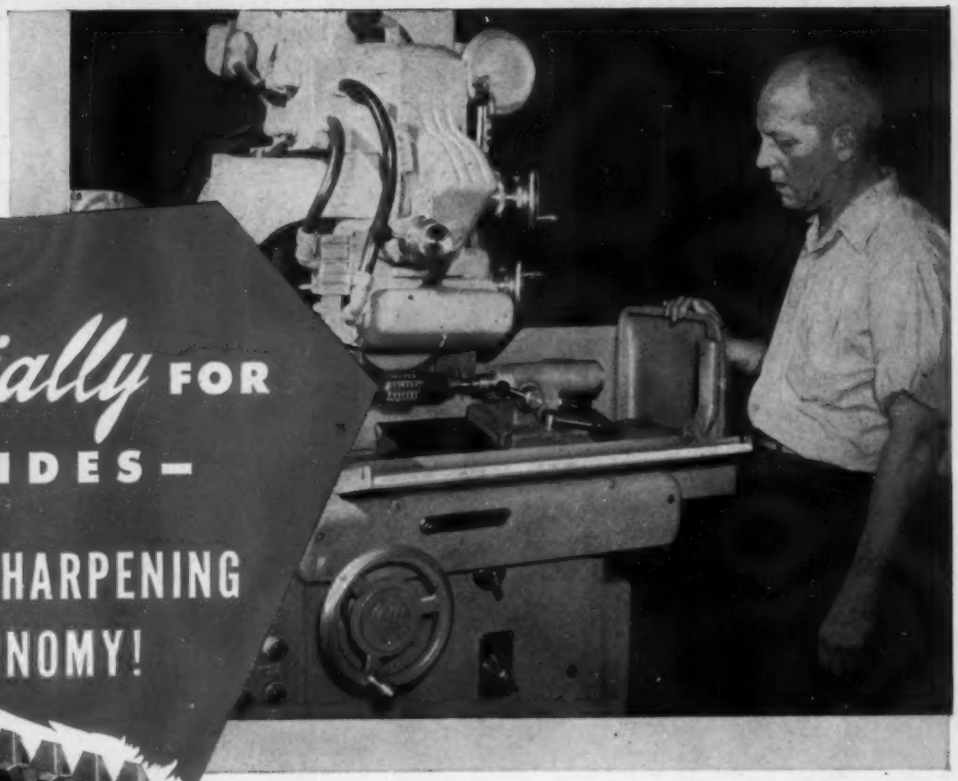
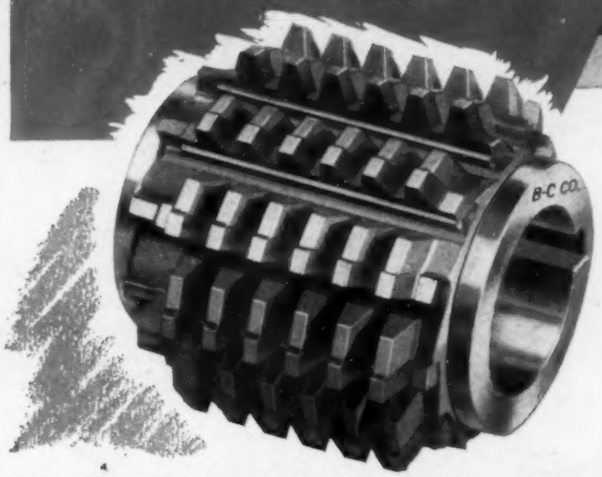


Especially FOR CARBIDES—

CONTROLLED SHARPENING IS ECONOMY!



TIME SAVING OF 76%, SHARPENING CARBIDE-TIPPED HOBS ON NO. 6-5

Three hours were formerly required to sharpen this carbide-tipped hob on conventional sharpening equipment. The No. 6-5 Hob Sharpener does the job in 42 minutes, holding indexing within .0005", and radial face alignment within .0007". As a result of complete mechanical control provided by the machine, precision sharpening is obtained in less than one-third the usual time. Two other important savings are realized in reduced wheel cost and longer tool life. The large diameter diamond wheel, plus wet grinding, increases cutting efficiency and reduces wheel breakdown. Longer tool life is obtained because less material must be removed to secure the required accuracy on indexing and cutting faces. The No. 6-5 machine is designed to sharpen high speed steel or carbide tipped hobs, formed cutters or thread mills up to 6" diameter and 5" face. Accuracy and efficiency of your sharpening operations can be improved with this precision machine.

PERFORMANCE DATA

Operation—Face sharpen carbide-tipped hobs, 2-3/4" x 2-3/4", 12 gashes.
Cutting Faces — Radial
Feed per Rev. — .0004"
Wheel — 7" Diamond, 3600 RPM
Stock Removed — .020"
Coolant — Oil
Sharpening Time — 42 min. (Former Time — 3 Hours)
Accuracy — Adjacent Spacing .0005", Radial Faces — .0007"

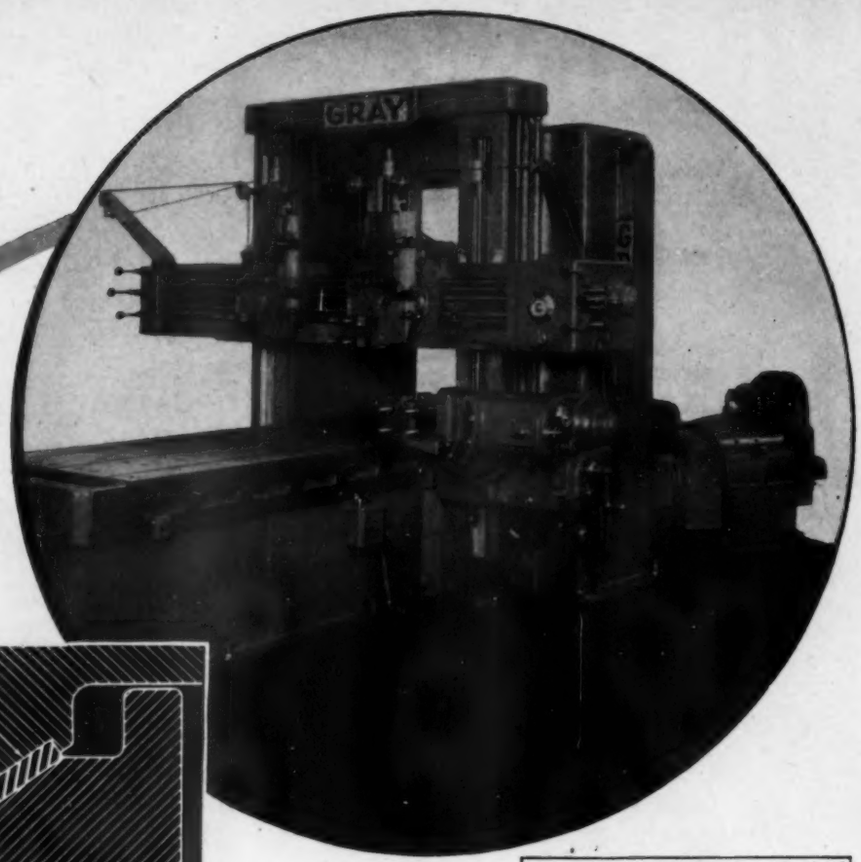
Write for complete information on the new No. 6-5 sharpening machine. Ask for bulletin No. 3213.

EASIER, MORE ACCURATE BARBER COLMAN HOB SHARPENING

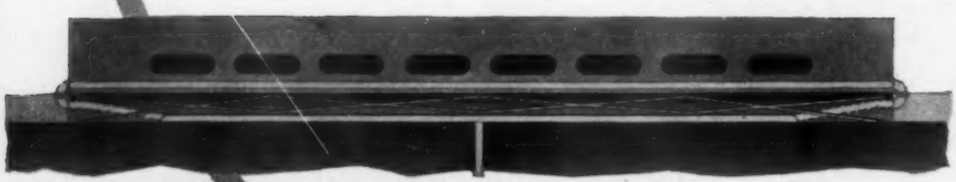
Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

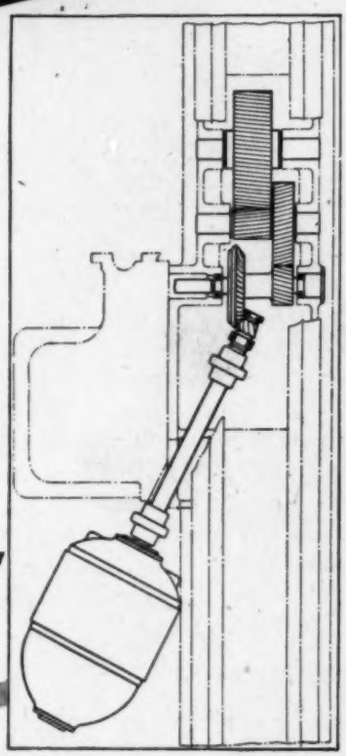
3 OUTSTANDING GRAY FEATURES



STOP SCORING *with the Gray Non-Metallic Ways*



INSURE PROPER LUBRICATION *with Gray Loop Lubrication*



SAVE SPACE *with the Gray Space Saver Drive*

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

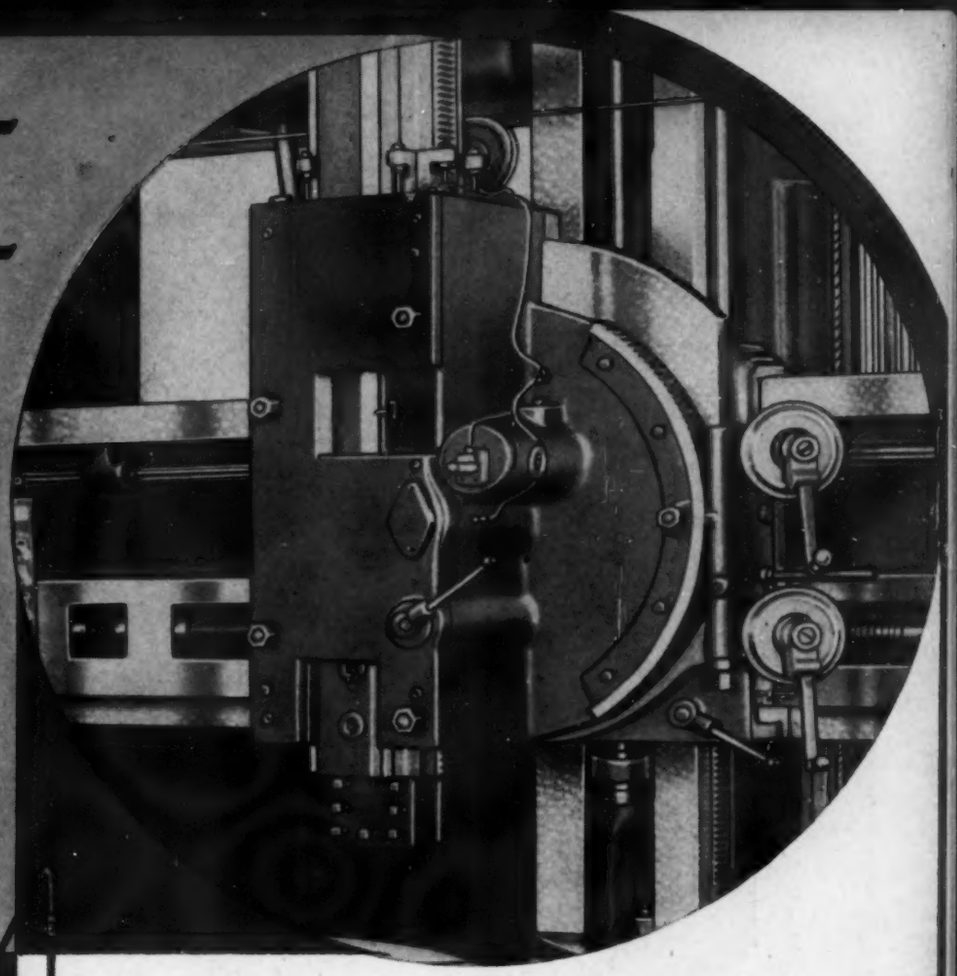
SOLD IN CANADA BY UPTON, BRADEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

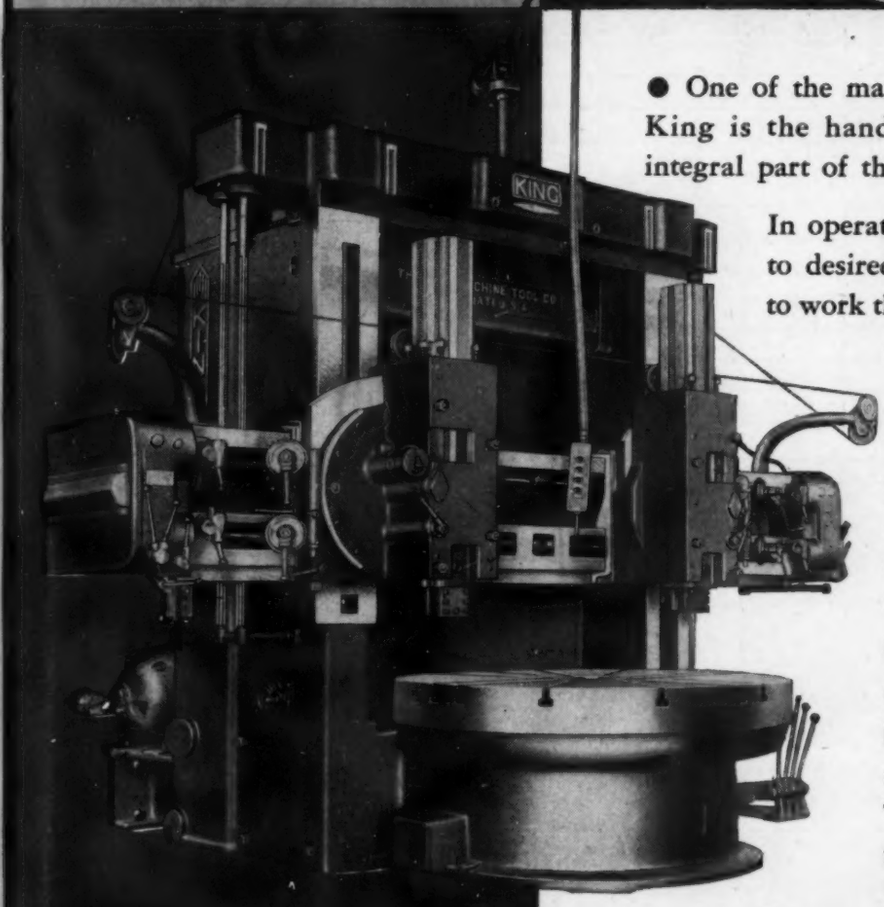
SKIM CUTS-
DEEP CUTS-

Adjustment is easily and quickly made on the

KING

Vertical Boring and Turning Machine





● One of the many conveniences of the New Series King is the hand adjustment levers which are an integral part of the head and travel with it.

In operation it is easy to rapid traverse head to desired position, traverse ram down close to work then with hand adjustment lever make final adjustment, accurately from normal working position.

Whether making a skim cut or deep cut in steel with carbide tool the massive head construction insures accuracy and its rigidity enables you to get exceptionally fine finish on skim cuts.

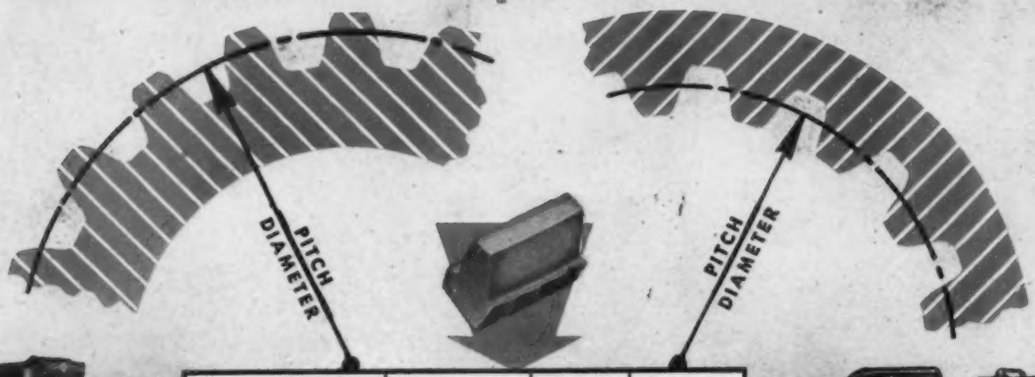
Consult a King Engineer on your boring—turning—and facing operations. King Vertical Boring and Turning Machines are available in ten sizes from 30" to 144".

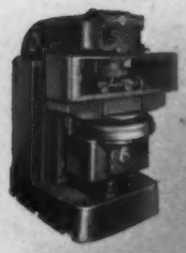
THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines and Sebastian Lathes

SPUR AND HELICAL GEARS ARE SHAVED AND CROWNED ON THESE RED RING MACHINES

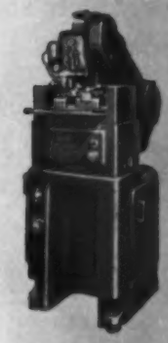




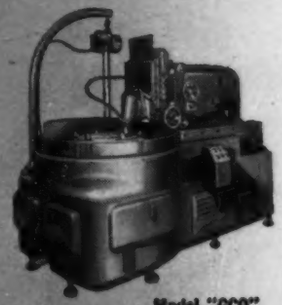
Model "GCU" Diagonal

Red Ring Machine Designation	External Gears Pitch Dia.	Teeth May Be Crowned	Internal Gears Pitch Dia.
GCL-3″	3/16″— 4″		
GCI-8″	1″— 8″	Yes	3″— 8″
GCI-12″	1″— 12″	Yes	3″—12″
GCI-18″	2¼″— 18″	Yes	3″—18″
GCP-24″	3″— 24″	Yes	
GCU-8″ Diagonal	1″— 8″	Yes	
GCU-12″ Diagonal	1″— 12″	Yes	
GCR-12″			3″—12″
GCI-36″	4″— 36″	Yes	
GCM-36″	4″— 36″		
GCQ-36″ Standard	12″— 36″		12″—36″
GCQ-36″ Spec. Small	5″— 30″		5″—30″
GCQ-48″	22″— 48″		22″—48″
GCM-48″	4″— 48″		
GCK-96″	24″— 96″		
GCK-120″	48″—120″		

Model "GCR" Internal

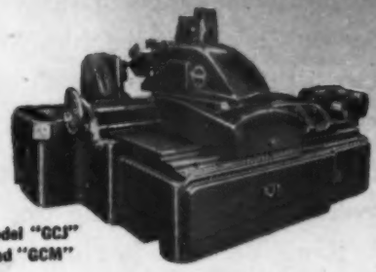


Model "GCL" Fine Pitch



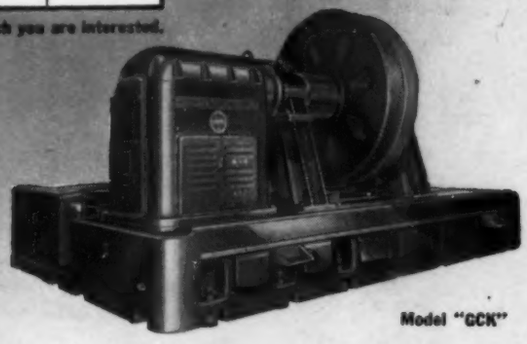
Model "GCQ"

Write for descriptive folder on the machine in which you are interested.



Model "GCJ" and "GCM"

Model "GCI" and "GCP"



Model "GCK"

RED RING PRODUCTS

NATIONAL BROACH AND MACHINE CO.

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2526

PUT IT ON THE BLANCHARD

(*No objections to parts with projections!*)

The Job: Grinding both sides of cast iron shutters for high vacuum service—removing 1/16 to 1/8" stock per side. *This part was formerly milled and scraped.*

The Method: Place 4 shutters (as shown) on the 36" magnetic chuck of a *standard* No. 18 Blanchard Surface Grinder. The fixtures necessary are the 4 unattached U-shaped steel brackets for blocking and concentric steel rings used to locate the pieces, the rings being placed over the magnetic poles of the chuck. Simply turn parts over to grind other side.

Blanchard Production: 8 pieces (16 surfaces) per hour—floor to floor.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

An important point to remember about BLANCHARD GRINDING is that IF THE SURFACE TO BE GROUND CAN BE BROUGHT TO THE WHEEL, A WAY CAN USUALLY BE DEVISED TO HOLD ALMOST ANY SHAPE OF PIECE.

In devising ways of holding and grinding parts with projections, Blanchard Engineers are ever ready to give every possible assistance. Avail yourself of Blanchard's Free Engineering Service—whether or not you already have a Blanchard Grinder. Simply send us the data, with samples if possible, for a prompt answer to your problem. You'll incur no obligation to purchase Blanchard equipment.

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The BLANCHARD MACHINE COMPANY

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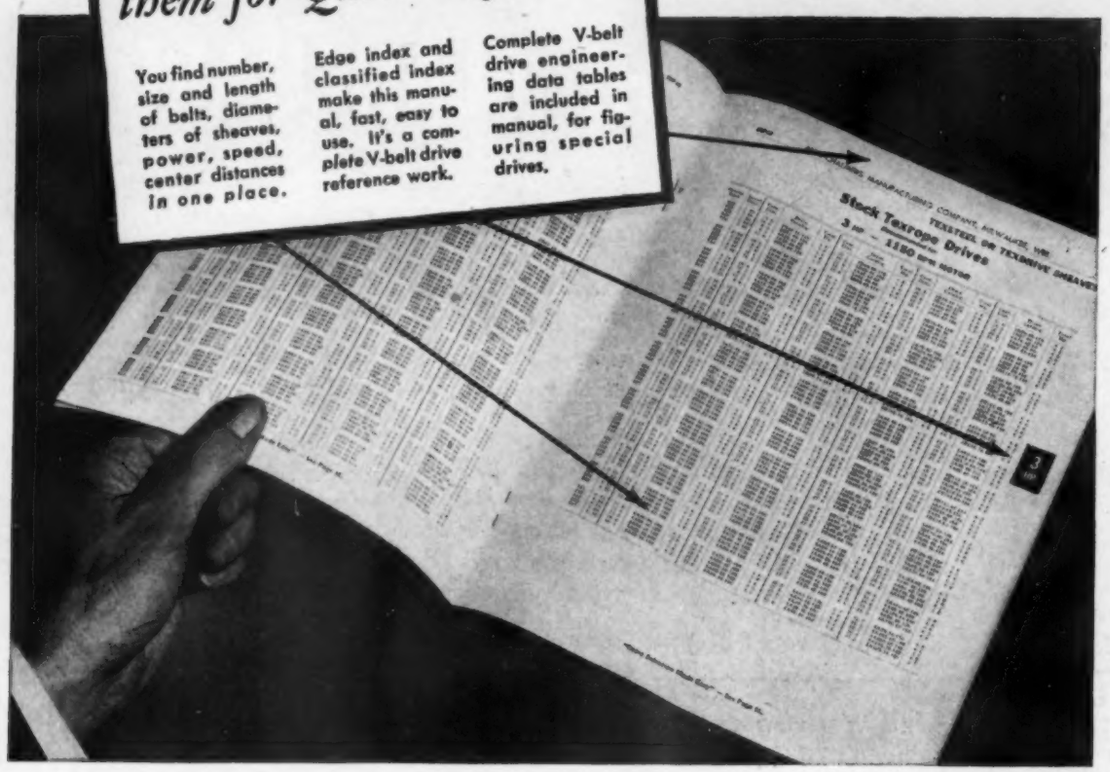
This New Manual Lists them for Quick Reference
You find number, size and length of belts, diameters of sheaves, power, speed, center distances in one place.
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Five Types — Sizes to suit every power transmission job.

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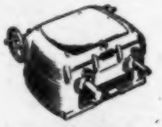
Exact variations in speed, stationery or motion control.



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Speed variations up to 375% at the turn of a crank.

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USING STOCK BELTS AND SHEAVES, Texrope engineers have selected the *best* drive for each requirement . . . the drive most economical in first cost and in maintenance.

Only Allis-Chalmers offers you this complete Pre-Engineered drive manual. It is the product of 23 years of industrial V-belt drive experience, the finest engineering talent in the business.

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TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

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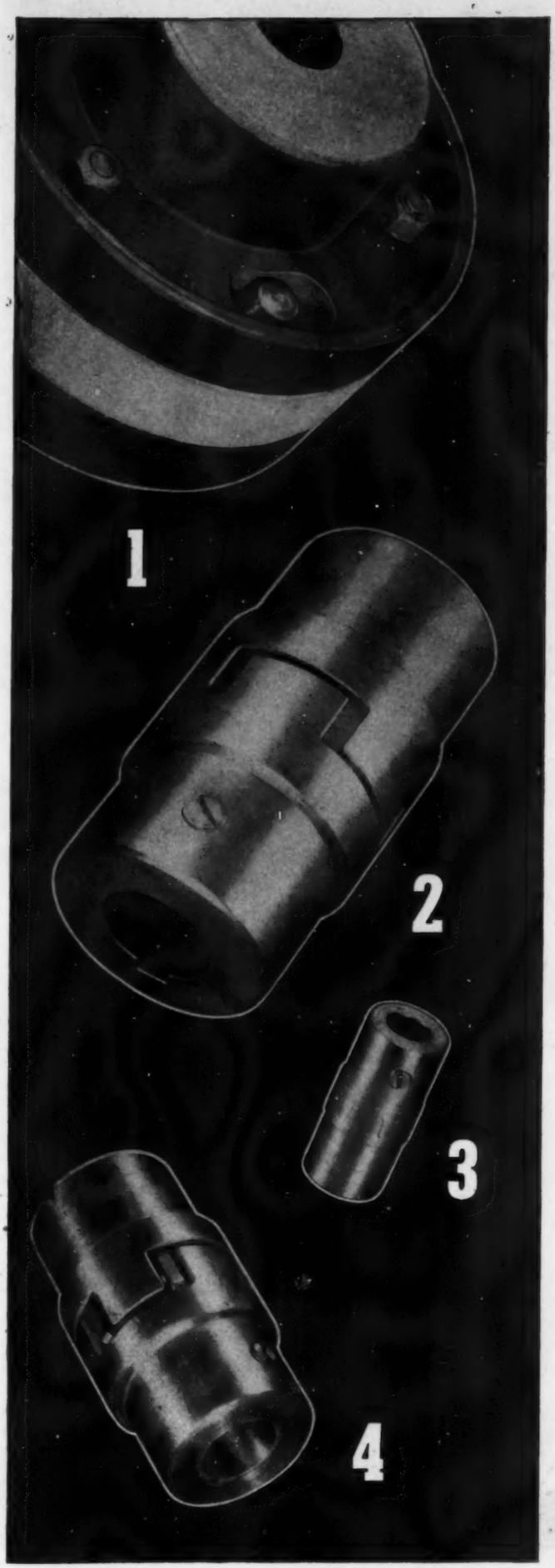

Which Coupling Shall I Use?

Here are four types of BOSTON couplings suitable for a wide range of applications from "flea" power up to 100 horsepower—available in 69 different stock sizes!

1 This is what is known as the Renold-Hardy flexible coupling and is made up of a flexible disc. of vulcanized rubbered fabric inserted between two metal flanges with hubs. It is available in various sizes capable of transmitting from 1 horsepower up to 100 horsepower.

2 This coupling is known as BOSTON type "FCN"—a three-jaw coupling and is made of a high grade, low carbon content steel with a non-metallic cushion between the jaws to absorb vibration or shocks. It is available in bore sizes ranging from ⅜" to 1½" diameter.

3 This coupling is known as BOSTON type "FA"—a multi-jaw coupling and is made of untreated steel. This coupling is particularly well suited for use with small displays or other light duty applications. It is available in bore sizes ranging from 3/16" to ½" diameter.

4 This coupling is known as BOSTON type "FCB"—a special ball bearing type flexible coupling and is made of case-hardened steel with an insert having hardened and ground steel balls. The greater flexibility of this coupling over an ordinary jaw coupling removes the strain between motor and machine, permitting unrestricted end play of motor shaft. It is available in bore sizes ranging from ⅜" to 1½" diameter.

One of the main features of these couplings is that practically all 69 sizes are carried in stock ready for immediate delivery. Send for your copy of Boston Gear Catalog 54 listing these 69 couplings as well as all other Boston Power Transmission Equipment and Component Machine Parts.

BOSTON GEAR WORKS
DIVISION THE MURRAY COMPANY
NORTH QUINCY 71, MASSACHUSETTS

GENTLEMEN: Please send me_____copies of Boston Gear General Catalog 54 containing complete specifications and list prices of your couplings and all other Boston Power Transmission Equipment and Component Machine Parts.

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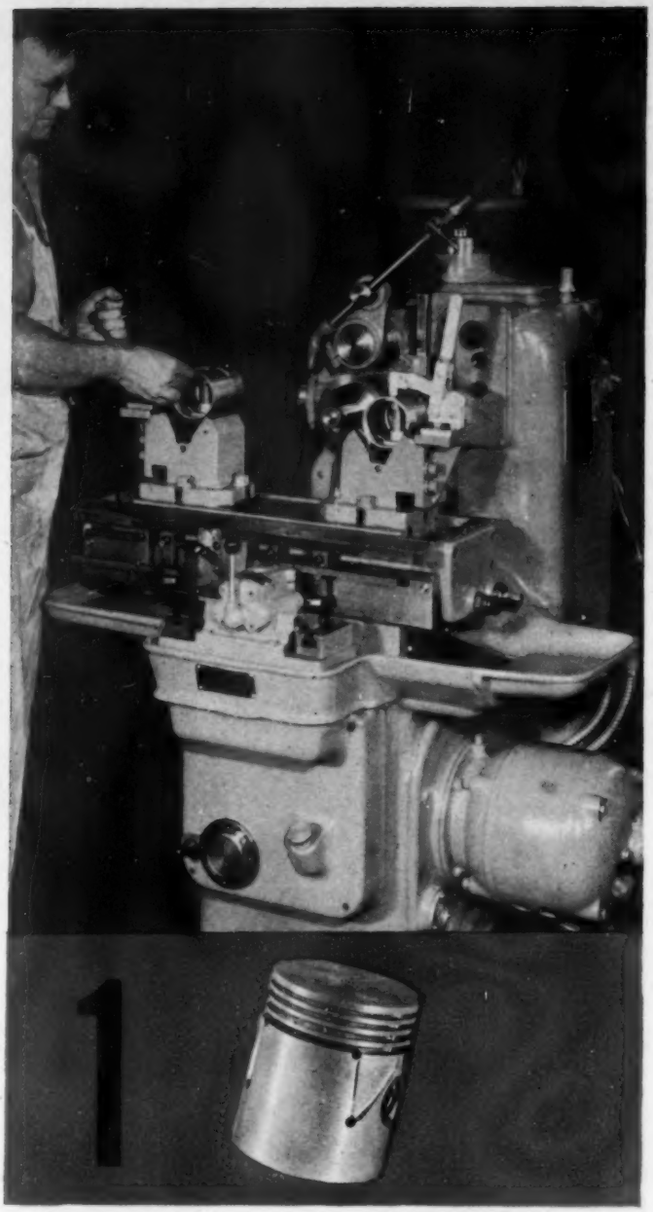
COMPANY_____

STREET_____

CITY_____ZONE_____STATE_____

You'll Get Practical Milling Methods Like These with.. SUNDSTRAND "Engineered Production"



——— Basically, there are two approaches to solving milling production problems, (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method — standard or semi-standard machines, if possible, or entirely special machines, if necessary.

This latter method is Sundstrand "Engineered Production" . . . the most practical approach to economical milling. The following is a brief resume of the complete engineering and manufacturing service available from Sundstrand to meet all or any of your production milling requirements in small and medium size work.

These actual examples are presented to reveal one of each of the methods used in solving milling production problems. One of these methods may be the solution to your present problem.

Milling 204 Pistons Per Hour With Standard Rigidmil

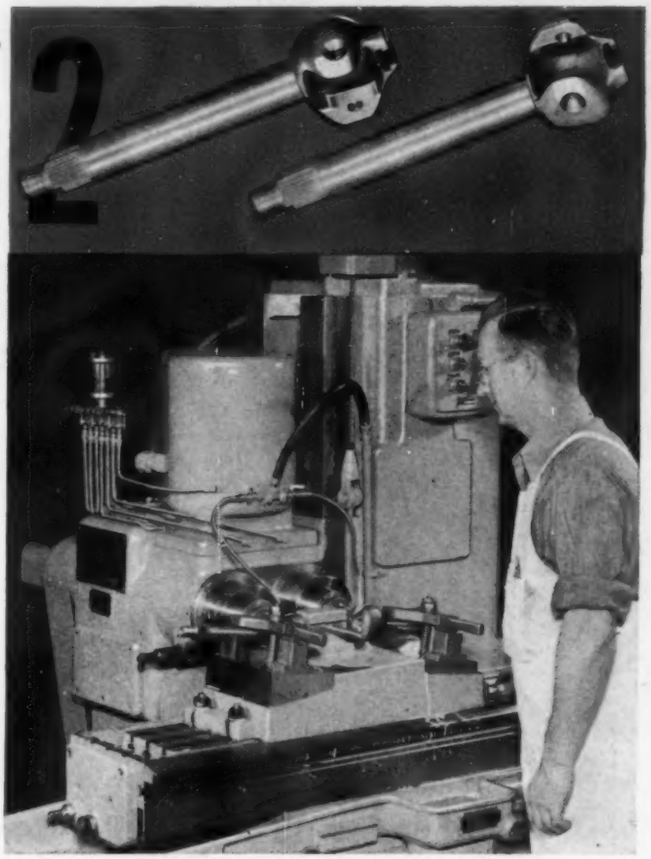
This Sundstrand No. 00 standard Hydraulic Rigimil is tooled to mill the expansion control slot in automotive pistons. It has a single horizontal spindle with speeds from 85 to 3600 rpm. The table is 7½" x 25" and has 8" of travel with a range of feeds from ½ to 37 inches per minute. The table is provided with work holding fixtures and a standard two-way automatic cycle. Consequently the operator loads in one fixture while work is being performed in the other. Loading time is free making it possible to mill 204 pistons every hour.

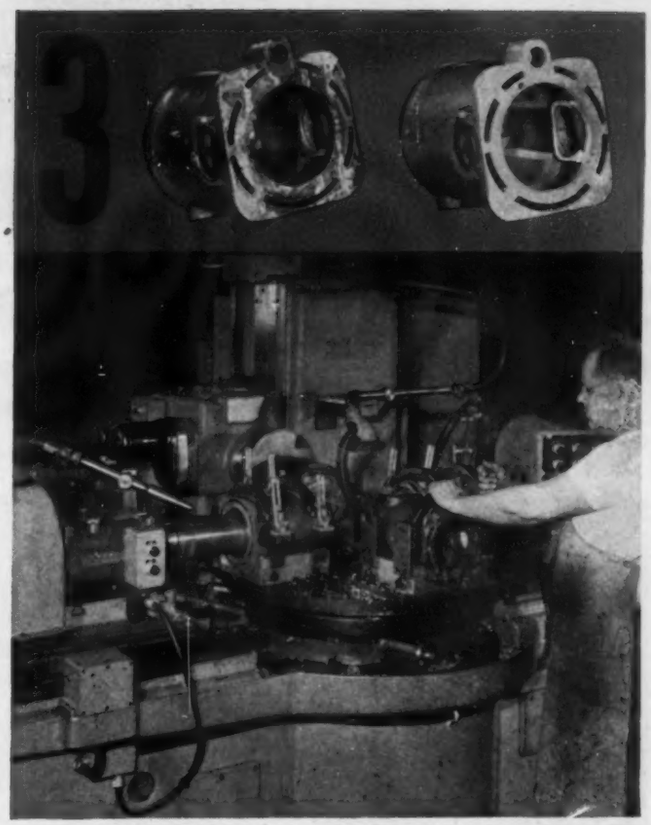
SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

Standard Rigidmil with Special Head Milling Internal Slots Simultaneously

Opposite slots inside of these gear shafts are milled on this standard Sundstrand Rigidmil provided with a special head. Quills have power movement endwise to bring cutters in and out of cutting position. The spindle head is provided with vertical power movement in combination with table movement to provide a rectangular cycle operating in a vertical plane. A special 2 spindle head replaces standard head so that 2 parts can be milled simultaneously.





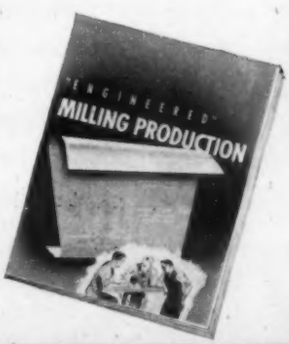
Special 3 Head Rigidmil Mills, Rough and Finish Bores Simultaneously

This four station special Rigidmil machines magnet frames in the following sequence: rough boring at station 1, face milling at station 2, finish boring at station 3, and loading and unloading at station 4. This machine replaces a conventional multiple tool lathe and, in addition, includes a milling operation.

The automatic machining cycle consists of rapid approach, feed, dwell and rapid return. The cycle is timed and interlocked with the 90° indexing fixture which presents the work in exact relation to the tools. No relocation or repositioning of the part is required. Various models of magnet frames are accommodated on this one special Sundstrand Rigidmil.

FREE ADDITIONAL DATA

Write for more proof of the successful application of Sundstrand "Engineered" milling production. This new 40 page book contains over 35 actual problem solutions together with interesting tooling diagrams. Write for your copy today. Ask for Bulletin No. 166.



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HARDINGE
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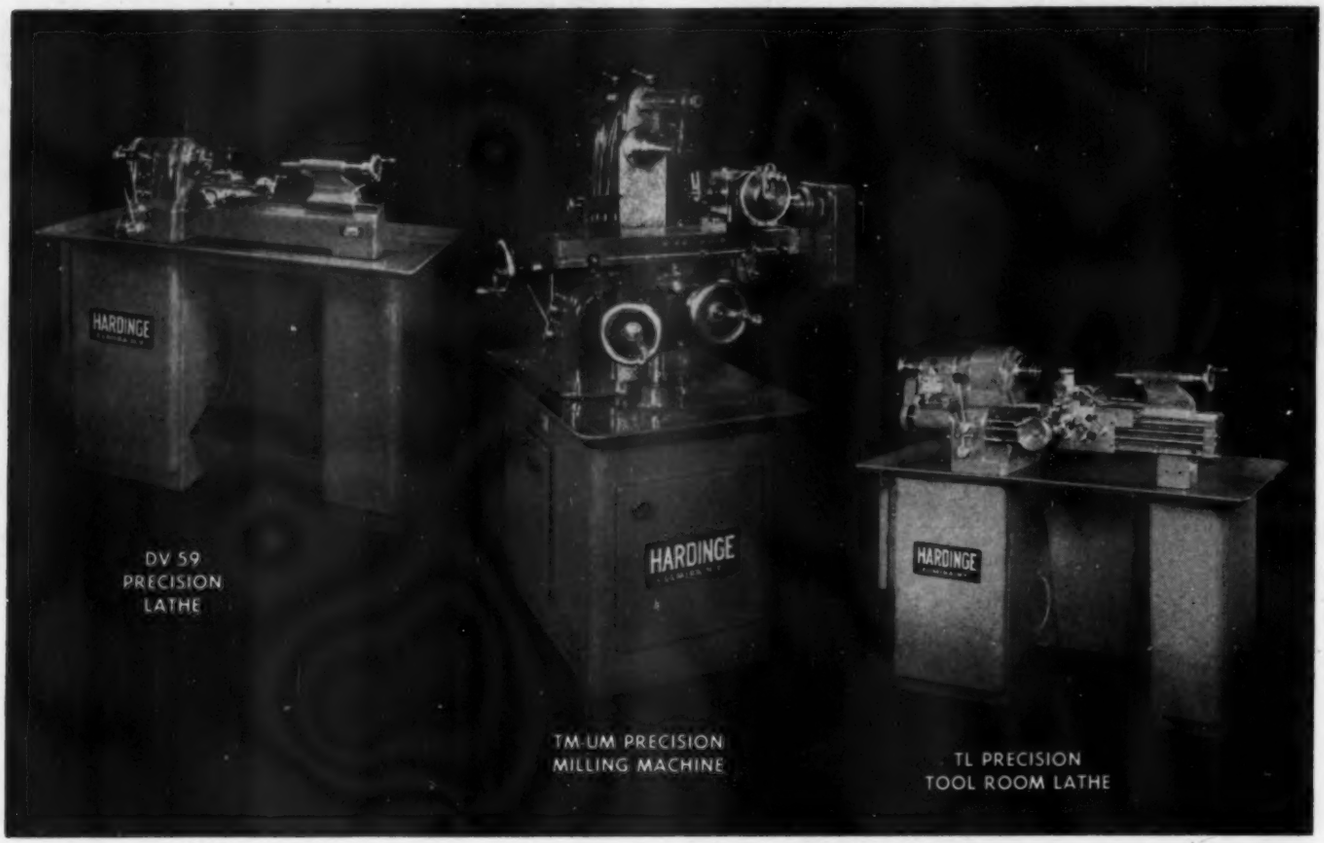
MATCHED FOR PRECISION TOOL ROOM WORK

HARDINGE High Speed Precision Lathe
HARDINGE High Speed Precision Milling Machine
HARDINGE High Speed Precision Tool Room Lathe



Here are three machines that are specifically matched together to step up precision production in your tool room, laboratory and development departments—the HARDINGE High Speed Precision DV 59 Lathe, the HARDINGE High Speed Precision TM-UM Milling Machine, and the HARDINGE High Speed Precision TL Tool Room Lathe.

Now you can handle, with facility, the greater portion of your tool room type work with lower costs than when done on large, slow machines. Interchangeability of attachments among these Hardinge matched machines permits handling a variety of work with minimum expense. For example, all spindles take standard 5C HARDINGE 1" capacity collets, including the spiral or plain index centers for the milling machine.

Write for illustrated bulletins which give complete details.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Offices in principal cities. Export office, 269 LaFayette St., New York 12, N. Y.

fast operator (Quick Exchange)

WHEN the tool room is flooded with calls for the fast production of odd lots of work, you need an internal grinder that's a fast operator—one that can be set up easily and changed over quickly. You need a Bryant No. 112 Internal Grinder.

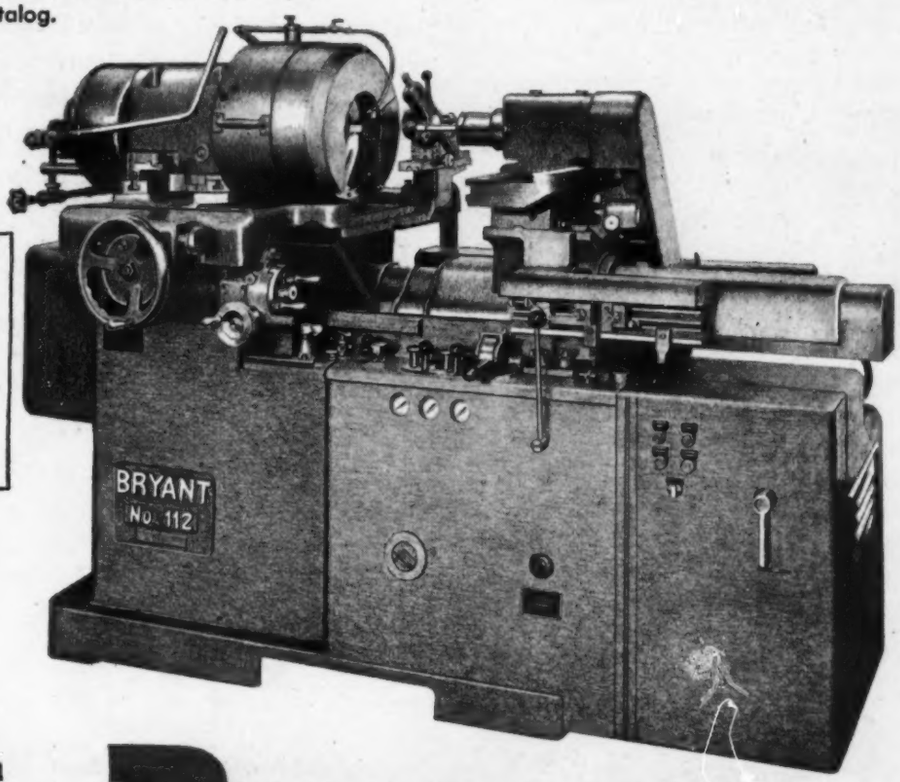
Quickly adjusted cycle controls for wheelslide—Selection of cycle phases either manually or automatically through main wheelslide control. Independent setting of wheelslide traverse for wheel dressing and grinding by two convenient hand throttles. Universal stop rod positions wheelslide for face grinding. Positive locking reversing dogs for setting grinding stroke quickly. Belt driven wheelheads; Hi-Frequency wheelheads for speeds up to 100,000 R.P.M.

Work spindle designed for operating efficiency—Rigid setting for taper grinding up to 90° included angle, provided by double circular slide mounting. Infinite spindle speeds from 100 to 1000 R.P.M. Quick interchange of chucks, holding fixtures and face plates provided by American Standard Type Cam Lock Spindle Nose.

Three cross-feed controls for versatility—Fast set-up provided by rapid traverse cross-feed. Increased output on long runs with power cross-feed control. Accurate size control through precision feed dial. These are the highlights that make set-up of the 112 simple and change-over fast. When combined with the basic features available in all Bryant grinders, they add up to less down time, more accurate work, finer work finish and faster production.

For more details on a fast operator that can handle more calls per day, just ask for the Bryant No. 112 catalog.

No. 112
HYDRAULIC
INTERNAL GRINDER



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BRYANT CHUCKING GRINDER CO.

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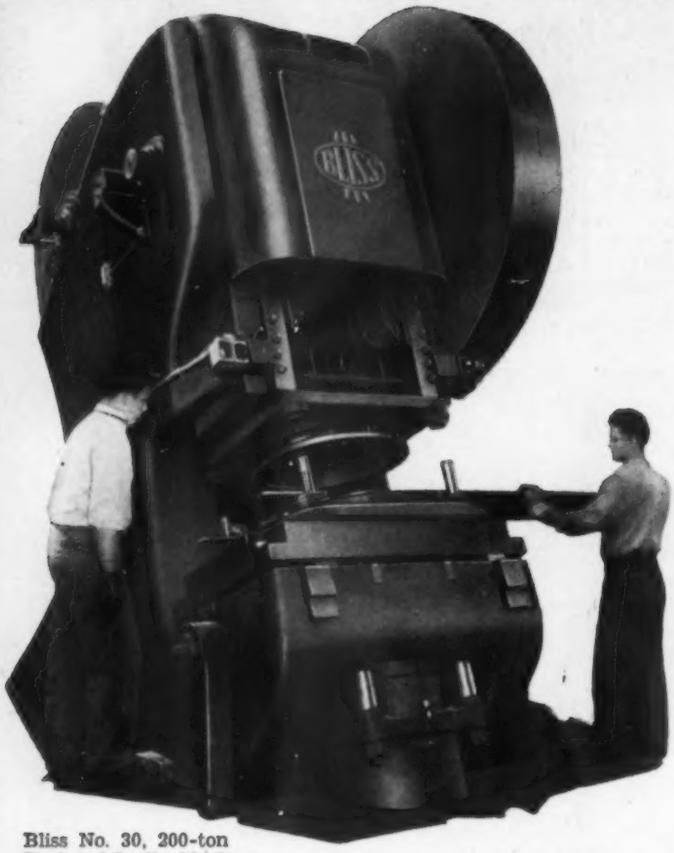
BRYANT

9 reasons why Bliss Inclinable

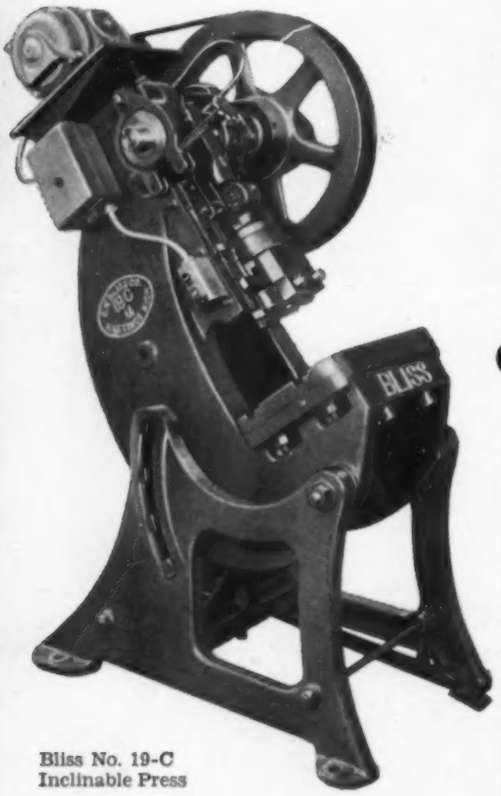


Bliss No. 30, 200-ton
Enclosed Inclinable Press

Rails and ties for Lionel electric toy trains are assembled at the rate of 1250 per hour in this Bliss No. 21 Inclinable Press with 48", 8-Station Bliss dial feed and a staking die.

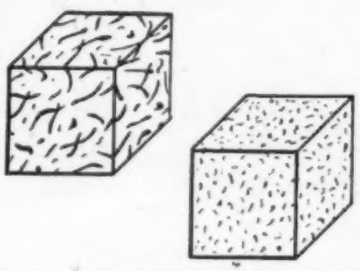
You have only to look "inside" a Bliss Inclinable Press to see where it gets its *ruggedness* and almost indestructible *precision*. Why it delivers consistent, uninterrupted performance over the entire range of press operations from blanking to drawing. Why it's the most-specified inclinable press among stamping shops and fabricators, with over 50,000 in use throughout industry.

Let's take a Bliss Inclinable apart pictorially and examine the physical reasons for its ruggedness and precision...whether it be a 10-ton or 200-ton press out of Bliss' range of 20 standard sizes.



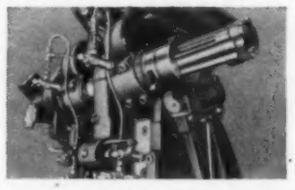
Bliss No. 19-C
Inclinable Press

❶ FRAME



Strong and durable press frames of high tensile Meehanite castings are produced under rigidly controlled foundry practices. These three-dimensional drawings show the distribution of graphite in ordinary cast-iron (left) as compared with controlled graphite structure of Meehanite casting (right) used in Bliss presses.

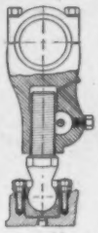
❷ CLUTCH



Often described as the finest positive clutch available on any press, Bliss patented Rolling Key Clutch is standard feature of Bliss Inclinables up to 5½" shaft. Note location of clutch keys near shaft center. This means slower-moving points of engagement, faster operating speeds, less shock during intermittent operation and longer life to all moving parts. Bliss Inclinables can also be equipped with air-operated friction clutch, which is standard for presses of 6" shaft diameter or larger.

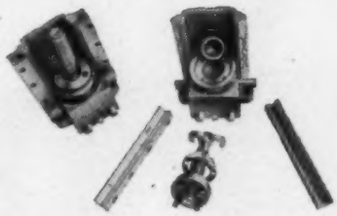
Presses outsell all other makes

❸ CONNECTIONS



Another feature is solid, plug-clamp connection strap, which gives full 360° bearing against slide adjusting screw. This arrangement also permits using V-thread on screw, making replacement easy.

❹ SLIDE ASSEMBLY

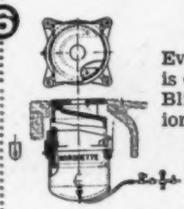


Slides are accurately gibbed to insure precise registry of die and punch. Ball seat is renewable, as are split bronze ball-cap bushings and laminated shim against which ball-cap is brought down by four bolts to give correct clearance for proper lubrication and fit. All parts are machined to close tolerances for interchangeability. For a fraction of the cost of a new slide, you can recondition the ball seat bearing.

❺ BEARINGS, WAYS AND GIBS

Main shaft bearings and connection bearings are bronze bushed. Roller Bearings are standard for drive shaft bearings on large geared presses. All wearing surfaces are especially finished to insure long life.

❻ CUSHIONS

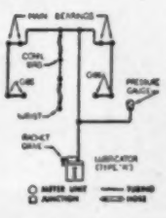


Every Bliss Inclinable Press is designed to accommodate Bliss Marquette die cushions which extend the press application to drawing operations on medium gauge metal.

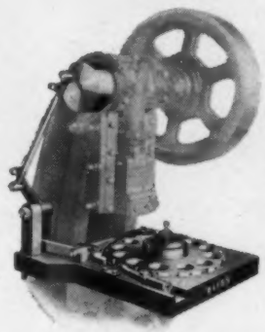
Many Bliss cushions are supplied for presses that have been in use for years. Placing the responsibility for efficient press and cushion operation with Bliss assures you of the utmost in satisfactory performance.

❼ LUBRICATION

Bliss Inclinables have floor-line lubrication systems with oil or grease fittings at main points of moving contact. All standard Bliss Inclinable frames are machined to take Bijur one-shot pressure system.



❽ FEEDS



Bliss Inclinable Presses are designed to take any type of Bliss automatic or semi-automatic feed. Addition of a few extra parts to the regular constant tension brake will convert it to an automatic releasing brake for continuous operation with roll, dial or magazine feeds. Every Bliss feed is engineered to specific requirements yet a large variety of standard designs is available. A Bliss feed on a Bliss press means the finest equipment that money can buy, plus a *single responsibility* for efficient performance of entire unit.

❾ SERVICE

All replacement parts and service orders carry *top priority* at Bliss to reduce your press "down time." Supplying service parts for presses more than 50 years old is routine at Bliss. Accurate-fitting parts are supplied from stock by virtue of precision manufacturing methods which guarantee interchangeability. A large sales and service organization is available. Incidentally, one effective way of preventing costly shutdowns is to call for a Bliss service inspection of your Bliss presses. A highly competent maintenance man will call on you and the chances are that he will spot trouble before it happens.

The Bliss plant at Hastings, Michigan is specially equipped for quantity production of parts for Inclinable Presses.

These are the reasons—plus the fact that *they are priced right*—that are most often reported by the trade for its preference of Bliss presses.

If your pressed-metal production calls for inclinable presses, you're sure to find the specific answer among Bliss' 20 standard sizes. And a Bliss sales engineer will be on hand to give you unbiased counsel. Remember too, "BLISS" on your press is more than a name...it's a guarantee!

Write today for catalog 2-B illustrating the new Bliss Inclinable Presses and Service Sheet A-105 giving operating and maintenance instructions for the complete line.

E. W. BLISS CO., 440 AMSTERDAM, DETROIT 2, MICH.

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

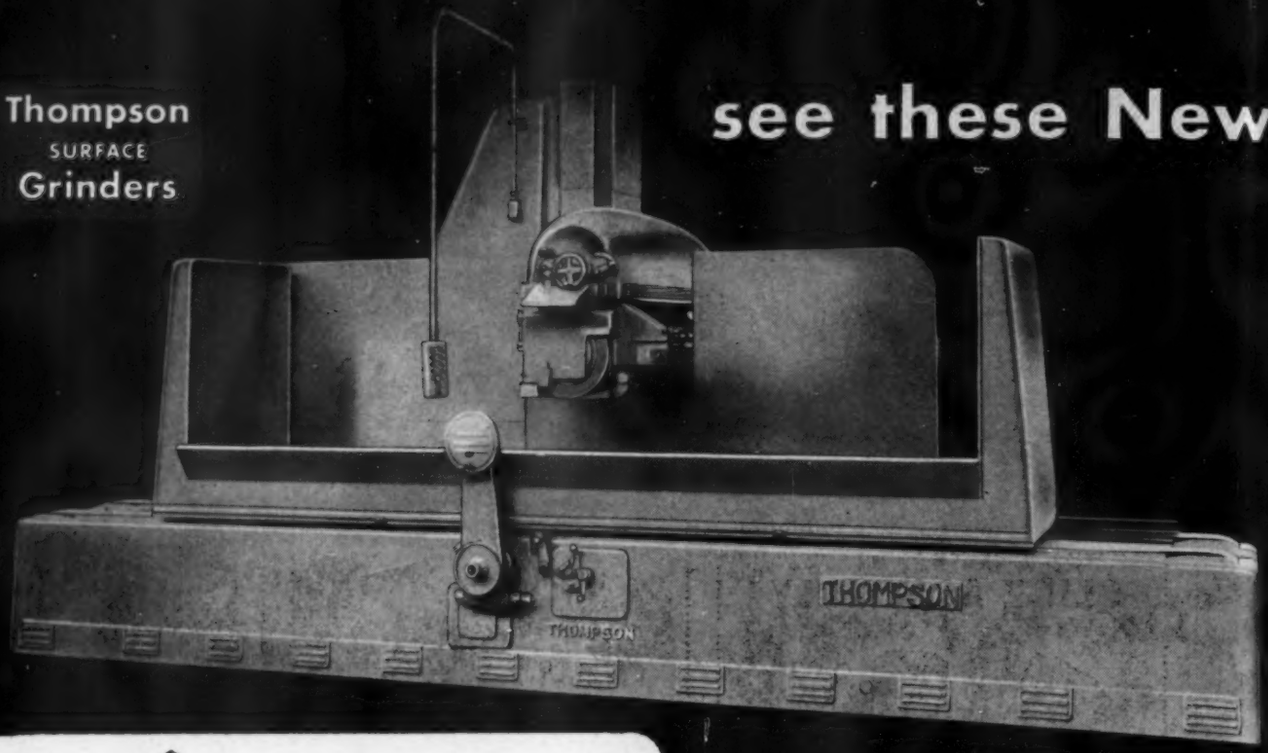
WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; Boston, Mass.; New Haven, Conn.; Windsor, Ont.

STAY AHEAD WITH *Bliss*

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

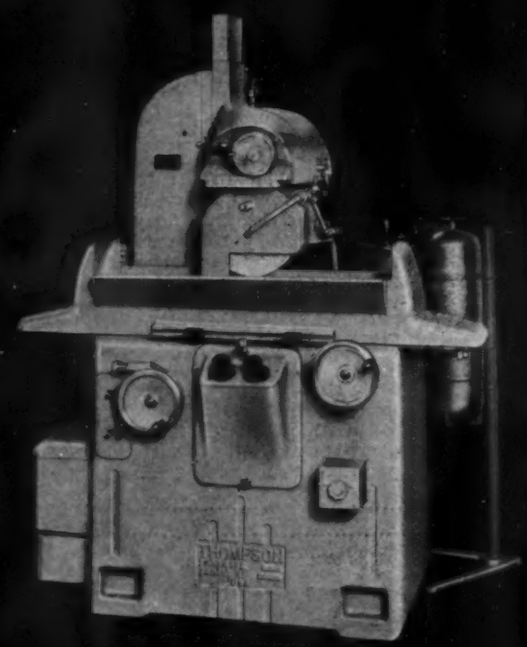
Thompson
SURFACE
Grinders

see these New.



Above—Thompson Heavy Duty Type CX 36" x 48" x 120" Hydraulic Surface Grinder. Equipped with super precision spindle powered with 40 H.P. motor, this machine is capable of heavy stock removal on large areas, and it produces the high degree of finish and accuracy so necessary in the grinding of machine tool bearing surfaces. All ways are completely covered, (a *must* in good grinder design) with complete automatic lubrication, insuring long life and accuracy.

At right—Thompson Type "F" 6" x 10" x 18" Hydraulic Surface Grinder. This machine is arranged to utilize a new principle of applying coolant to the grinding wheel. All of the coolant is applied through the grinding wheel making it possible to grind exceedingly thin sections without burning or warping the work. Very fine finishes are obtained to extremely close dimensions. An outstanding advantage of this process (patented) is gained in grinding blanking dies and other metal cutting or shearing tools. No amorphus metal is present after grinding thus increasing the life of the tool between grinds.

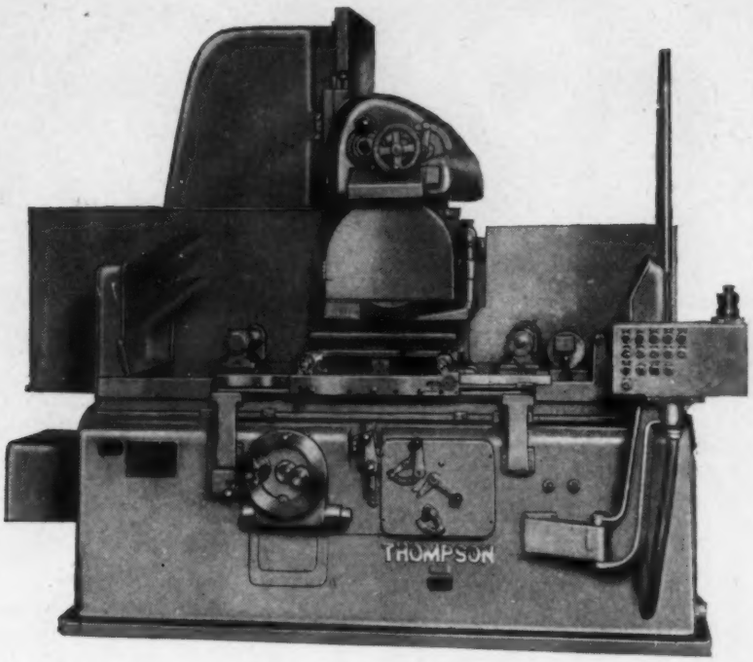


At left—Thompson 12" x 11" x 48" Dovetail Way Grinder. A new machine in the Thompson Line—new in principle, designed to eliminate the expensive job of hand scraping machine tool dovetail way bearings. The machine illustrated has capacity for a 12" wide by 48" long male or female dovetail slide, with size control from electric diamond dressing devices. Both sides of the dovetail bearing can be ground simultaneously to a predetermined dimension.

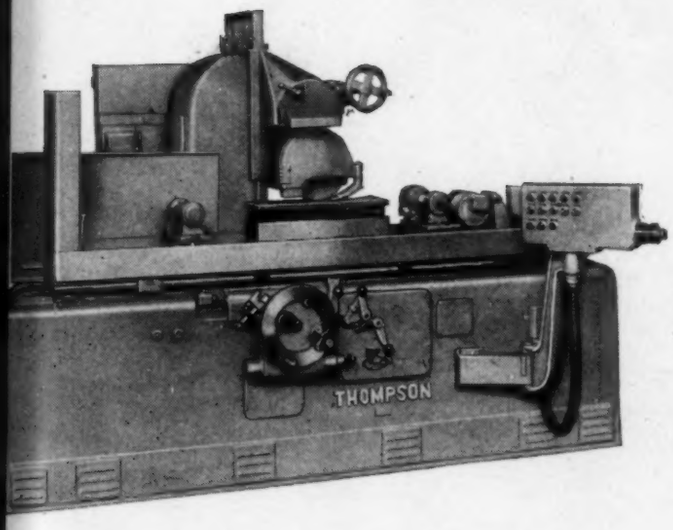
Thompson Machines

There's a Thompson for Grinding every Flat Surface or Contour

THOMPSON TRUFORMING



Above—Thompson Type "C" 16" x 16" x 36" Truforming Grinder. The latest design of a Truforming (Crushed Wheel Grinding) machine arranged with Thread Roll Die Grinding Fixture equipped with 20" dia. x 6" face wheel driven by 30 H.P. motor. The application of this machine to the grinding of Thread Rolling Dies is revolutionizing the industry. Ground dies produce better threads with greatly increased die life. The cost of ground thread dies made with this machine is less than milled dies. When the dies are worn, they can be reground without any other processing.



At left—Thompson Type "B" 12" x 11" x 36" Truforming Grinder. A new design of a popular Truforming (Crushed Wheel Grinding) machine arranged for production grinding of intricate contours, such as flat form tools, serrated milling cutters, tangent type thread chasers and many other precision forms. This machine features automatic wheel crushing, regrinding and reproduction of crushing rolls, and automatic size control.

Before You Buy

Investigate

Thompson SURFACE Grinders

Address Dept. 11

THE THOMPSON GRINDER COMPANY, INC.

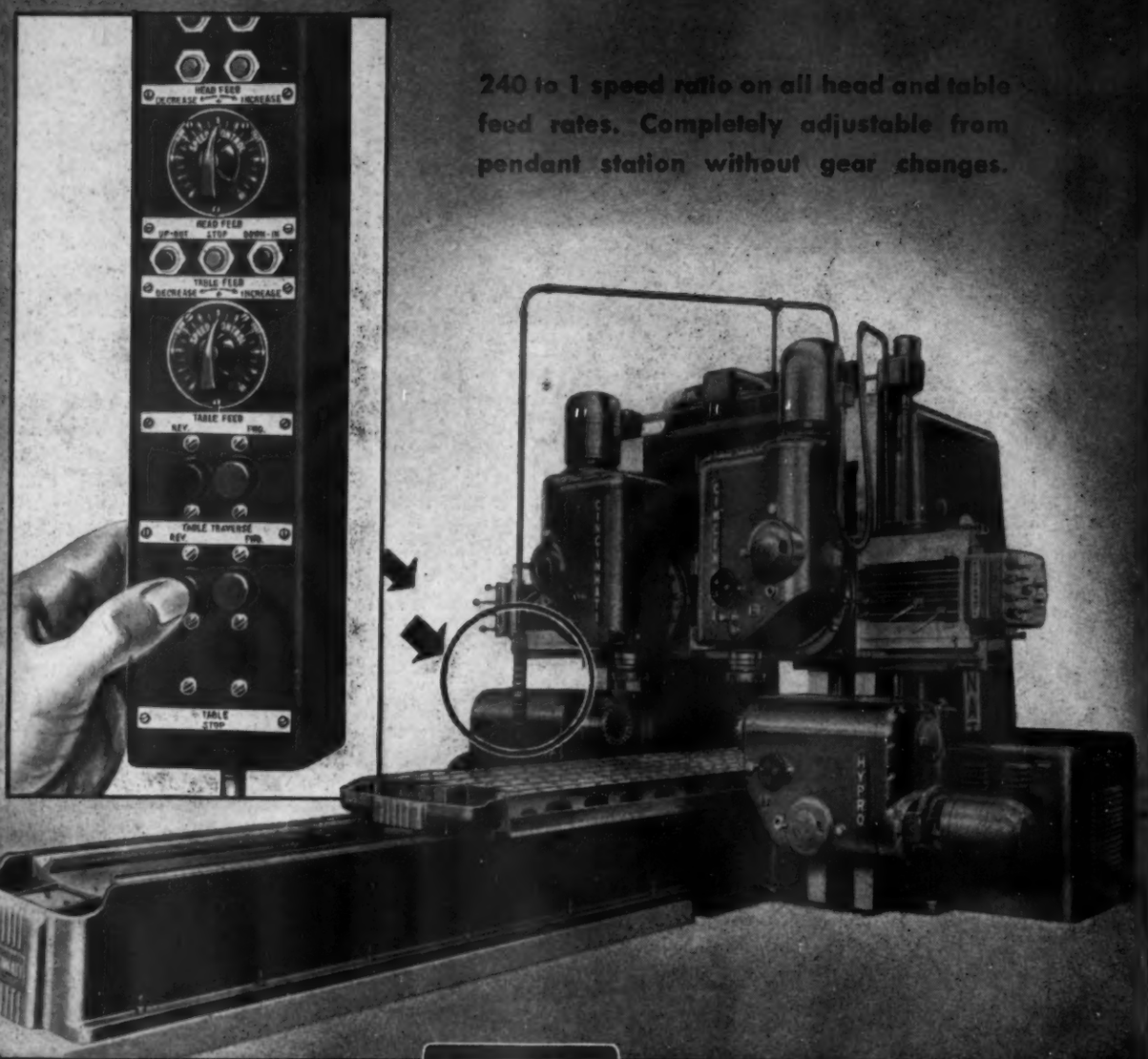
SPRINGFIELD, OHIO

Copyright 1947—The Thompson Grinder Co., Inc.

240 to 1 SPEED RATIO...

Hypro-electronic

PLANER MILLER DRIVE

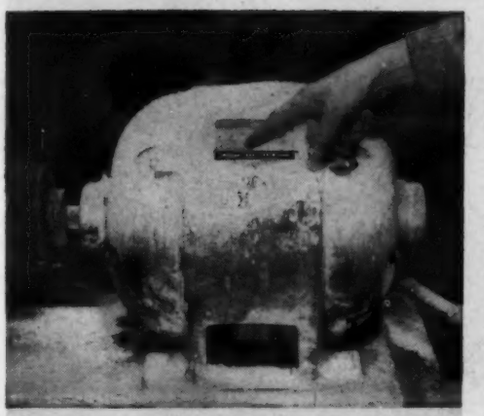


240 to 1 speed ratio on all head and table feed rates. Completely adjustable from pendant station without gear changes.

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO



Keeps Its Bearings in "Dust Bowl"

Ordinarily, we wouldn't recommend that you use an open motor on a job like this. This Tri-Clad motor drives a boiler-feed pump in the National Gypsum Company plant at Clarence Center, N. Y. The air surrounding the motor is constantly filled with gypsum dust which must be kept out of the bearings. And it *has* been kept out of the bearings of this Tri-Clad motor, thanks to its specially designed bearing housing and seals. We believe that the Tri-Clad motor you see here proves that even where dust, moisture, or some other hazard is extremely severe for open-motor applications, the extra protection afforded by Tri-Clad motor construction results in longer motor life and lower upkeep.

The toughest motor yet!

The Tri-Clad totally enclosed, fan-cooled motor is designed for use in adverse atmospheres — in iron dust, out of doors, in hazardous areas, and chemical atmospheres. It gives you these important construction features:

- A cast-iron, double-wall frame which completely encloses and protects the windings and punchings.
- A nonshrinking compound around motor leads which protects motor interior from dust and moisture.
- A rotating labyrinth seal which further protects the motor interior from damage by foreign matter.

TRI/CLAD
REG. U.S. PAT. OFF.
MOTORS

ON 1,220,000 MOTORS

TRI/CLAD

THE SYMBOL OF EXTRA PROTECTION

Announcement of the Tri-Clad motor, back in 1940, ushered in a new concept of general-purpose motor design. Substantially increased horsepower-per-frame-size was one feature. Smarter appearance was another. But what really sold more than a million Tri-Clad motors is the *extra protection* we built into them.

Today, with the "family" including dripproof motors, vertical motors, gear-motors, capacitor-motors, and totally enclosed motors, Tri-Clad motor is, more than ever, the motor that means basic protection, dependable performance, and minimum upkeep. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

EXTRA PROTECTION... AGAINST PHYSICAL DAMAGE!

Rigid cast-iron frame and end shields protect vital parts from external abuse and prevent resonance. Because they're not at the mercy of a coat of paint, they strongly resist chemical attack and dampness. Cast iron also gives you tight, *metal-to-metal* fits between end shields and frame.

EXTRA PROTECTION... AGAINST ELECTRICAL BREAKDOWN

Windings of Formex* wire together with improved insulating materials, reduce the chances of electrical failure. Heat is dissipated quickly — motor stays young for years and years.

EXTRA PROTECTION... AGAINST OPERATING WEAR AND TEAR!

Bearing design affords longer life, greater capacity, improved lubrication features. Bearing seals retain lubricant, keep out dirt. One-piece, cast-aluminum rotor is practically indestructible.

*Trade-mark reg. U. S. Pat. Off.

GENERAL ELECTRIC

150—285C

SUPERFINISH
...assures it!

● Yes, you can double—triple—quadruple—the life of bearings with simple, precautionary measures which take only a few minutes.

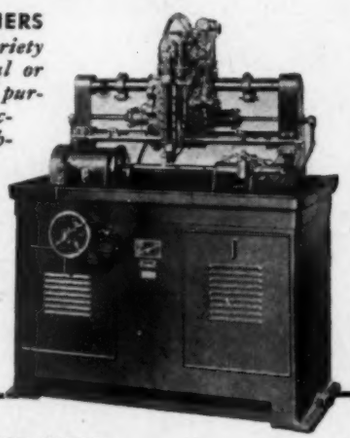
Examine a finely ground surface. No matter how smooth it may appear, it has defects in the form of grinder scratches, chatter and feed marks, and "smear metal" softened by the heat of grinding wheels. When these tiny metal ridges rub together, they rupture the protective oil film to cause scoring, excessive wear and increased clearances.

Superfinishing removes these defects—produces a bearing surface that is virtually frictionless. And its life is almost unlimited.

Superfinishing is a much quicker and more economical process than you may think. And it pays for itself many times over in better service and lower replacement cost.

Ask your nearest Gisholt Representative for the facts about Superfinishing.

GISHOLT SUPERFINISHERS *are available in a variety of types for cylindrical or flat surfaces; for general purpose or continuous production work; also as attachments for use on lathes. Write for literature.*



GISHOLT MACHINE COMPANY · *Madison 3, Wisconsin*

TURRET LATHES · AUTOMATIC LATHES · BALANCERS
SUPERFINISHERS SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface finishing and balancing of round or partly round parts. Your problems are welcomed here.

Production gaging with External Comparator No. 951 and Amplifier No. 950.

NEW! *Electronic* MEASURING EQUIPMENT

by Brown & Sharpe

● EXTERNAL ● INTERNAL

Precision gaging on a mass-production scale is now both practical and economical for any plant or laboratory! The new Brown & Sharpe Electronic Measuring Equipment applies electronic super-sensitivity to measurement, and electronically amplifies the results for instant, accurate reading on a large calibrated dial. It enables accurate gaging to .00001", as fast as test-pieces can be handled.

An outstanding advantage of this new Electronic Measuring Equipment is the separate amplifier unit, which isolates heat-producing elements and prevents temperature drift in gaging units. Another unique feature is the true linear response of the gaging units, which permits accurate setting for the entire scale with only one gage block or master. These are only two of *many* advantages.

Get the full story of this versatile new Electronic Measuring Equipment. Write for details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

We urge buying through the Distributor

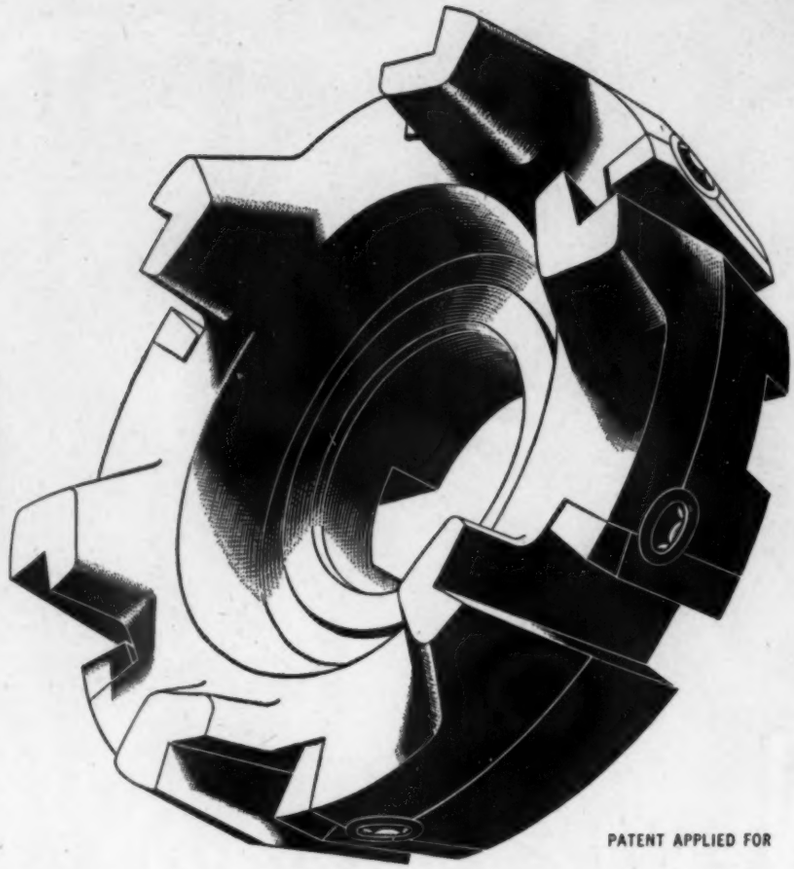
Speedy internal gaging with Internal Comparator Attachment No. 952, Amplifier No. 950 and Signal Light Attachment No. 958 (optional).

Gage Head Cartridge No. 953 is shown mounted in special fixture for linear gaging.

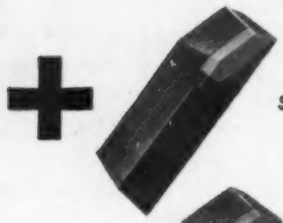
BROWN & SHARPE

NOW

you can use the SAME cutter body



PATENT APPLIED FOR



STANDARD BLADES MX-100

for cutting steel

STANDARD BLADES MX-200

for cutting cast iron

STANDARD BLADES MX-300

for non-ferrous metals

Once the blades are slipped in and lock screws tightened, your milling cutter is ready to go to work, as blades are furnished with all clearance angles precision-ground. Blades may be re-sharpened individually on a carbide grinder and quickly reassembled in the body, or the assembled cutter may be re-sharpened in the conventional manner on a cutter grinder. Write for illustrated folder which gives complete data and prices.

The GAIRING

E-CON-O-MILL

A New Carbide Face Mill Made in Standard Sizes 5-inch Diameter and over

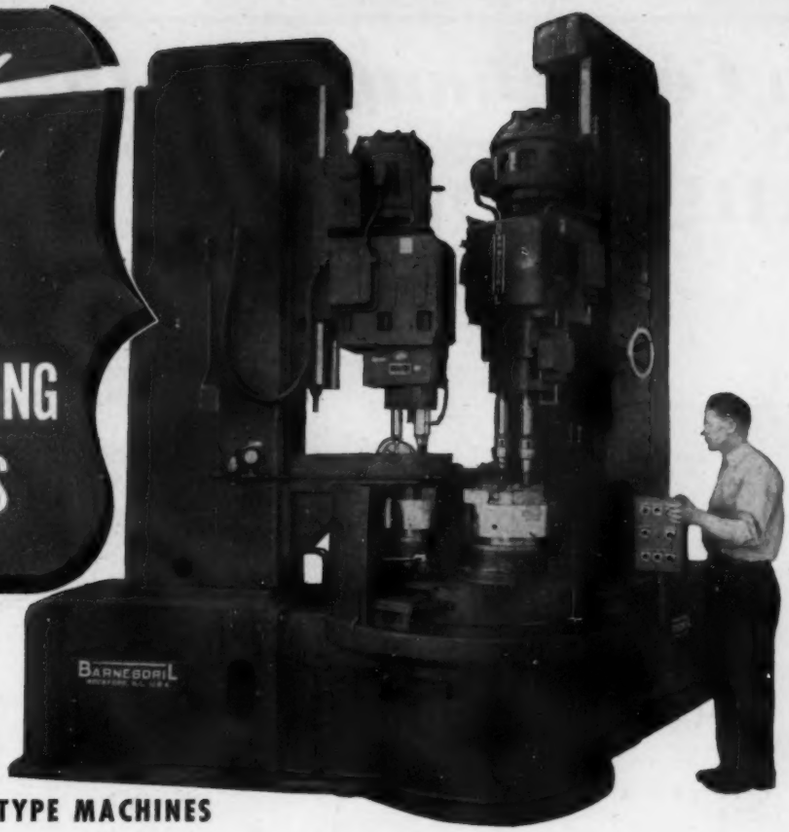
REDUCE DOWN-TIME OF YOUR MACHINES

CUT DOWN YOUR TOOL INVENTORY

The Gairing Tool Company, 21226 Hoover Road, Detroit, Michigan

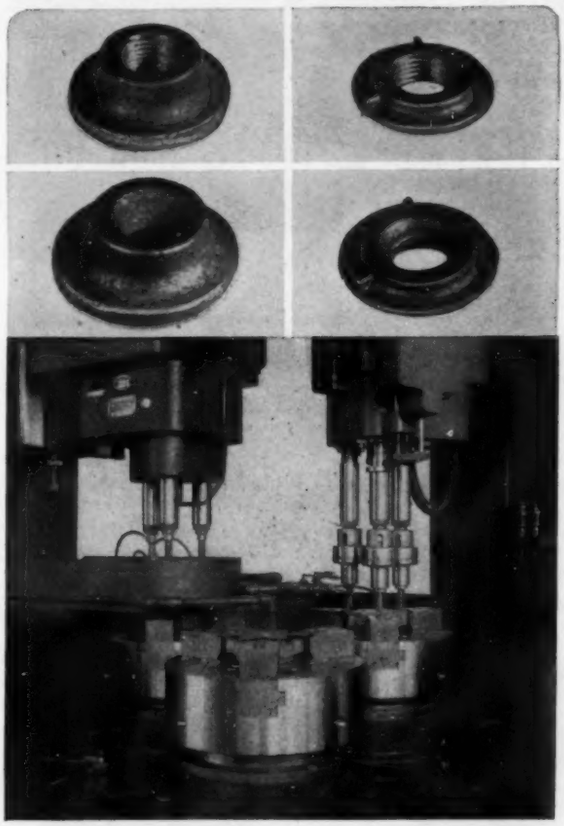
fast

LOW COST MACHINING ON SMALL PARTS



525 *Pieces* PER HOUR REAMED AND TAPPED ON BARNESDRILL HYDRAULIC UNIT-TYPE MACHINES

Special BARNESDRILL hydraulic 2-unit machine for reaming and tapping pipe flanges.



Holes, 1/4" diameter x 3/4" deep, are reamed and tapped from rough forgings at the rate of 525 per hour.

With idle machine time almost eliminated, this BARNESDRILL unit type machine reams and taps 525 pipe flanges per hour from rough forgings. A 3-station automatic indexing table, provides loading-unloading at one station, while reaming and tapping successively at two other stations. Special quick-acting fixtures, and 3-spindle heads make it possible to machine three pieces per load, resulting in a floor-to-floor time per piece of 6 seconds.

The combination of timed cycle control and reduced non-productive machine time have resulted in faster output and lower cost per piece on this job. BARNESDRILL hydraulic production units are adaptable to a large number of drilling, reaming, tapping, threading, facing, counterboring, or milling operations with similar efficiency and savings. Consult your BARNESDRILL representative for details on application to your machining problems.

Send for copies of new bulletins describing hydraulic units and special tooling and fixtures. Ask for bulletins B1504 and B34

DRILLERS BARNESDRILL BORERS

40 Years of Distinguished Machine Tool Development.

BARNES DRILL CO.

830 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

No Cam Changes on this New

Single Spindle Automatic

by WARNER & SWASEY

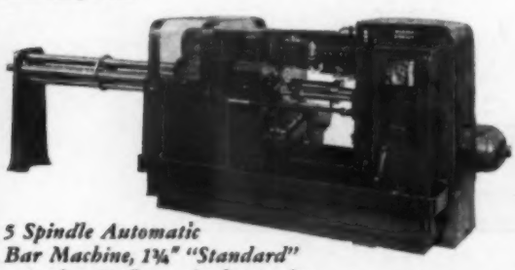
The entirely new Warner & Swasey 1-AC single spindle automatic chucking machine eliminates all cam changes for turret and cross-slide strokes. Feed strokes are obtained by a simple setting of a trip in the exclusive "Quick-Set" mechanism. Any one of six feeds from each of the three ranges may be automatically selected for any turret station.

Front or rear cross-slide, or both, can be operated on any turret face, or while the turret is dwelling. Other of the many outstanding features are: eight ranges of four automatically selected speeds; shockless turret indexing for maintaining original accuracy; skip-indexing of turret to eliminate unnecessary approach strokes; maximum rigidity, simplicity of setup, and many new operator conveniences.

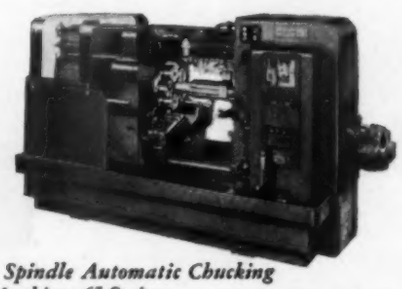
8" or 10" Chuck • 6" Turning Length

OTHER AUTOMATICS

now built by Warner & Swasey include 5 spindle Bar and Chucking Machines which feature the exclusive, patented "Quick-Set Mechanism". *This eliminates need for cams.* Work stroke settings are made by quick, simple adjustment on a graduated quadrant. The fast changeover makes it practical and profitable to use Warner & Swasey Automatics for small, medium and long runs.



5 Spindle Automatic Bar Machine, 1¼" "Standard" capacity; 2¼" oversized capacity.



5 Spindle Automatic Chucking Machine, 6" Swing.

To get full, up to the minute information on the latest developments in Warner & Swasey

TURRET LATHES

AUTOMATIC CHUCKING AND BAR MACHINES

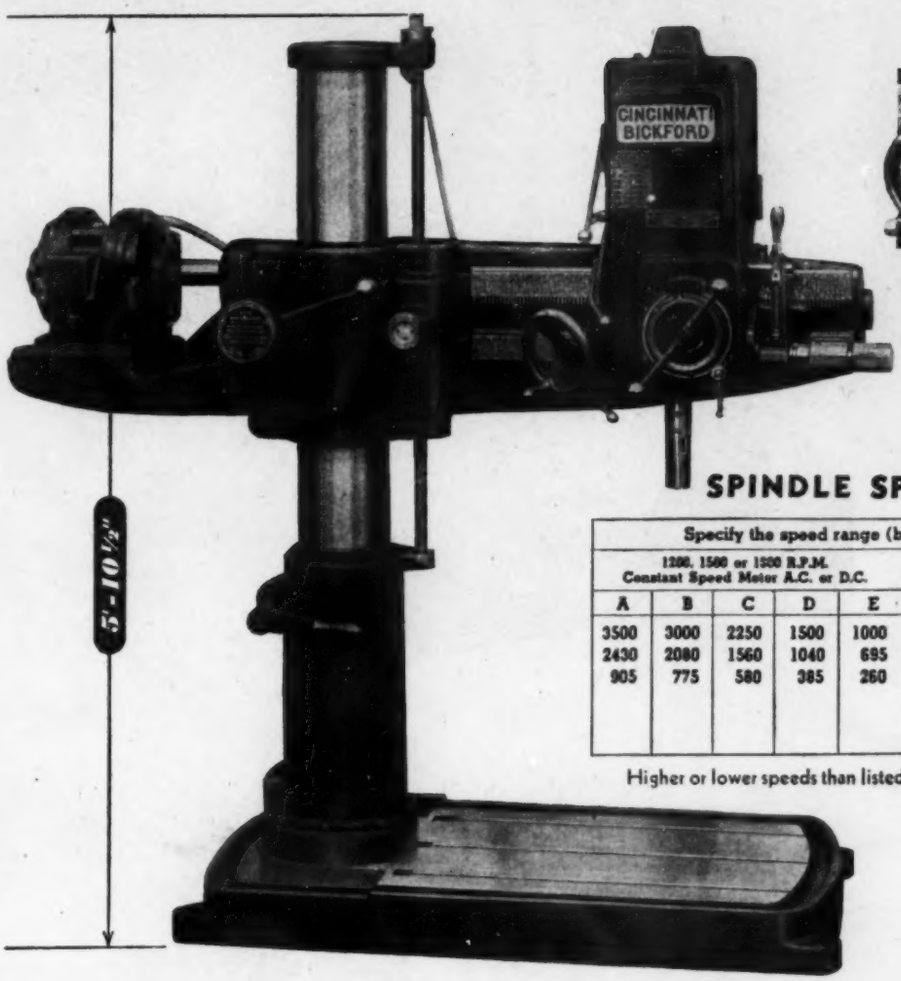
PRECISION TAPPING AND THREADING MACHINES

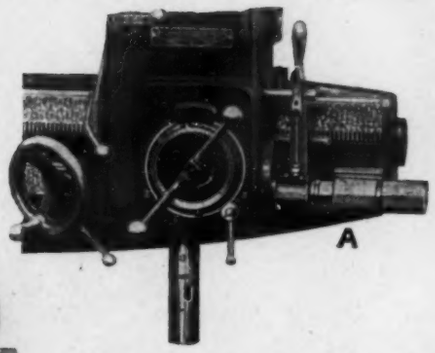
CHUCKS AND TURNING TOOLS AND ACCESSORIES

call in the Warner & Swasey field representative or write Warner & Swasey, Cleveland.

WARNER & SWASEY
Machine Tools
Cleveland

Safe...Simple...Speedy





Hand wheel is operated by left handle, while right hand (grip A) controls advance and return of spindles and automatically controls direction of spindle rotation.

SPINDLE SPEED RANGES

Specify the speed range (by letter) that meets your needs									
1200, 1500 or 1800 R.P.M. Constant Speed Motor A.C. or D.C.					900/1800 R.P.M. or 750/1500 R.P.M. Two Speed A.C. Motor				
A	B	C	D	E	F	G	H	J	K
3500	3000	2250	1500	1000	3500	3000	2250	1500	1000
2430	2080	1560	1040	695	2430	2080	1560	1040	695
905	775	580	385	260	1750	1500	1125	750	500
					1215	1040	780	520	345
					905	775	580	385	260
					450	385	290	190	130

Higher or lower speeds than listed above are available on special order.

New distinctive features which reduce mass production costs are found in this simplified high-speed Cincinnati Bickford 7½" diameter, 2½' arm Super Service Radial.

You save in power, floor space, and in initial investment. You get a machine, that gives the operator maximum ease and speed in handling.

The machine is sturdy, and will give continuous high production.

Write for Bulletin R-26A. It is completely illustrated and gives a complete description.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9. Ohio U.S.A.**

DoALL

Reg. U.S. Pat. Off.

Contour Sawing

INDUSTRY'S MULTI-PURPOSE PROCESS FOR FASTER LOW-COST PRODUCTION . . . FOR CUTTING ALL MATERIALS

Sweeping economies in die making over old methods

Shape-cutting "castings" and "forgings" from ordinary stock material

Tools of all kinds like these micrometer parts are cut fast, accurately

Patterns and templates are cut with speed. Edges are smooth—no bur

"Stampings" made by stack-sawing. There's no cost of punches and die

Jigs and fixtures, sawed and welded, eliminate machine time

Contour sawing is ideal for m . . ing countless production p

Pipe, tubing, structural iron, etc., is sawed at any curve and angle

19 Models

Contour Sawing saves industry thousands of man-hours every day. It differs from other machine-tool processes in that it does not waste time "whittling" stock to shape but *slices* off unneeded parts – even hard alloys and tungsten carbide. Makes internal or external, curved or straight cuts at any angle. Operators trained in few days – do not need years of machinists' experience. With many special blades and infinitely variable speeds, *Contour Sawing* cuts anything and makes amazing production economies in all industries. Ask about the special DoAll customer research service, free movie for industrial groups, schools, etc.

DIAMOND TOOTH
SPIRAL EDGE
SPIRAL SAW
PAPER KNIFE
SCALLOP KNIFE
SKIP TOOTH
FRICTION SAW
CLAW
BUTTRESS
PRECISION
Blades for Every Purpo
Iron . . Steel . . Copper . . Brass . . Al
Forgings . . . Dies . . . Tools . . . Machi
Castings . . Stainless steel . . Tungsten
Heat-treated steel . . Alloys . . Wood
. . Laminates . . Hard-pressed
. . Ceramics . . Glass

The DoALL Company

Reg. U. S. Pat. Off.

REPRESENTATIVES IN 56 COUNTRIES

DoALL STORES IN KEY CITIES

Des Plaines, Illinois

American Machinist's Spot NEWS OF METALWORKING

War Department's district ordnance offices are reported expanding personnel and are insisting upon security regulations more stringent than during World War II.

WAA's Detroit office has only 4000 surplus machines left out of 25,000 on hand on July 1. The number was reduced to 11,500 by Sept. 1. Since then, JANMAT has taken 7500 units. Some 1,890,000 tons of scrap has been sold from surplus (including machine tools) since last March. Another 1,332,000 tons will be secured by next July. Navy and merchant ships declared obsolete are the best source.

National Labor Relations Board in a unanimous decision has upheld dismissal by Copperweld Steel Co. of local union president and five other members of CIO Steel Workers Union for instigating a strike last year in violation of a no-strike agreement covering the company's Warren, Ohio, plant.

Jet engine program for U.S. air forces is much larger than many people think. Automotive circles are now involved and inquiries are being made for new tooling for jet production.

Strip steel 16 in. wide, 32 gage, is being used by porcelain enamel industry to make porcelain enamel wall covering for bathrooms and kitchens. The finished material can be cut with snippers and fitted to walls with stainless steel molding or can be pasted on with a special paste.

Pressed Metal Institute proposes: (1) steel mills set up procedure to insure use of steel by purchaser who should return it at purchase price if not used; (2) distribution of steel on the basis of prewar history of purchases; (3) steel-company-owned stamping plants get same allocation of steel as independents; (4) steel mills resume shipment of hot-rolled steel to stampers with long record of use; (5) allocations be made regardless of geographic location of customer; (6) steel companies fill orders from stampers who have historical position with mills, regardless of size.

Strong shift to the right in United Automobile Workers stacks UAW-CIO and Philip Murray's Steel Workers against the Leftish Electrical Workers among CIO's Big Three. It aligns 922,000 steel and 920,000 auto workers against 600,000 electrical workers. This preponderance of power on the right will have its influence upon many other CIO unions.

A high-speed lathe for turning aluminum pistons and other products has been developed by the Aluminum Co. of America. It is of unusual design and in experiments has turned steel up to 1500 fpm. Complete description is being given at ASME Atlantic City meeting this week.

New special equipment and special tooling on standard machines are not capitalized by one St. Louis company, which charges them off to current operations.

Extensive retooling will not be necessary for rings, bearings, pistons and other parts for the new so-called Kettering high-compression engine to be produced by General Motors in next two years. However, every gas station which handles the gasoline for this engine will have to be equipped with new tanks and pumps.

International Nickel is extruding stainless steel tubing up to 10 in. diameter through carbide dies at its Huntington, W. Va., plant. Stainless steel is said to have a self-lubricating characteristic which makes it easier to extrude than most carbon steels.

Lincoln Electric Co. has won its fight with U.S. Tax Court to allow almost $2 million in employee annuity and trust fund payments as "ordinary and necessary expenses" deductible from income for tax purposes. Lincoln regarded the payments as additional compensation for services rendered.

Warning to companies choosing to battle renegotiation settlements: unless you can present evidence that original deal was palpably unjust, your whole case is subject to reopening, and final settlement may be larger than one disputed in court. Such are implications in Crucible Steel Casting case.

HERE IT COSTS LESS TO CONVERT

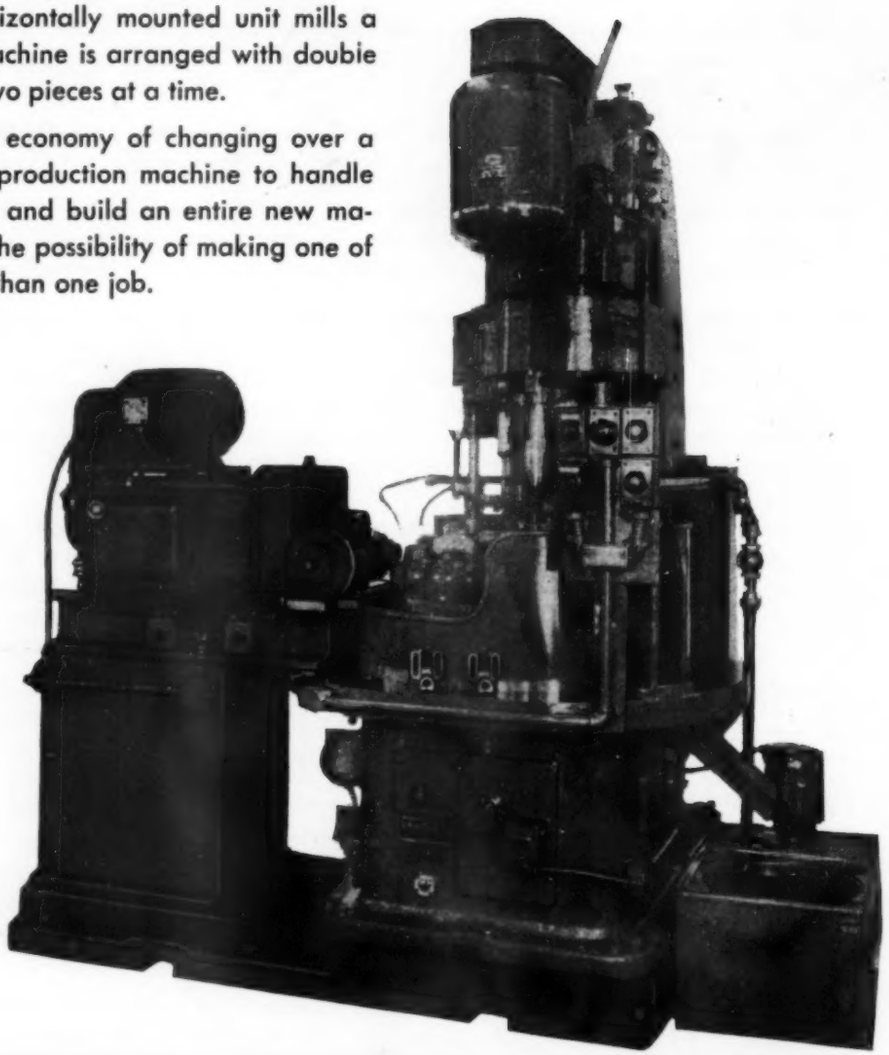
from this *to this*

THAN TO PURCHASE A NEW MACHINE

● With the addition of a new base-column—and hydraulically operated milling head, this original vertical drilling machine was converted from drilling, reaming and facing holes in water outlet castings to drilling and milling operations on fan mounting brackets.

The vertical hydraulic unit on the original machine drills a ¾" hole in the bracket while the horizontally mounted unit mills a 1.015"-1.025" slot in the work. Machine is arranged with doubie holding fixtures to accommodate two pieces at a time.

This additional unit illustrates the economy of changing over a more or less single purpose high production machine to handle another job rather than to design and build an entire new machine. Why not consult Morris on the possibility of making one of your machines adaptable to more than one job.



MORRIS has the experience, engineering "know-how" and facilities to assist you in making an economical conversion or to develop a high production machine for drilling—reaming or facing operations.

Builders of MOR-SPEED Lines

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Plain Talk About Europe

Like it or not, we have two jobs to do in Europe. One is to provide relief and is pressing in its urgency. The other is to help individual countries to get back on their feet economically as soon as possible.

The proposed program is outlined beginning on page 104A of this issue. An attempt is made there to evaluate its impact on our own economy.

Most people agree that we should aid a sick western Europe to become healthy again. As long as misery prevails, the area is wide open as prey for communism.

Up to this point, there is little disagreement. The split begins over the amount of aid to be given and the strings attached to it.

None of us wishes to dig into our tax pocket and come up with huge sums which will be used to bolster undemocratic forces in any nation, or to rebuild an economy controlled by leaders unfriendly to private enterprise.

None of us is so naïve as to believe that our wealth, in dollars and in material resources, is so great that we can pour it out prodigally in whatever amounts other nations request without eventually impoverishing ourselves.

None of us wishes to invite further inflation. Supplying to others the goods which are short here may well cause prices to soar into the upper regions unless the matter is carefully handled. The result might be a drying up of our own economy and disaster for everybody, here and abroad.

But it would be a grave and perhaps fatal error for us to assume that for the reasons just outlined, we should let the program go by default.

Take Britain. We cannot afford for our own sakes to withhold reasonable aid from her. She is our best, and one of our few, friends in the world today. Though a Labor government is in control, she still operates as a democratic nation. She has free and open elections. She has free speech and a free press. She is a bulwark of individual liberty that is close to an area in which individual liberty has been all but extinguished.

It is a false assumption to believe that Britain's adventures in nationalization are the prelude to complete nationalization of her industries. There are, in fact, signs that the Labor party does not possess a mandate from the people to perpetuate itself in office.

Our job is to help Britain and to make sure that whatever we send over is used for purposes to which we agree in advance. That much supervision we are entitled to.

We cannot put ourselves in the position, on the other hand, of threatening to withhold aid unless Britain agrees to the imposition of rules which no sovereign people could be expected to accept. If we did that, it would be as manna from heaven to the Soviet authorities in supporting their charges that we have "imperialistic aims."

In varying degrees, the situation with regard to France, Italy and the other countries participating in the Marshall program is the same as Britain's.

Whatever we do, we cannot be sure of the results. We will be taking a gambling chance that the Marshall program will help those countries in which the democratic process still is alive and functioning.

It is a chance worth taking because there is no satisfactory alternative. The time is late and we cannot afford to fiddle and do nothing.

Our only hope is to proceed without delay.

Burnham Finney

EDITOR

* A Hogging Demonstration.

HOGGING!

No shaper hogs off metal without power at the cutting tool or without rigidity or without an overall ability to stand the gaff.

Cincinnati Heavy Duty Shapers, outstanding for many years in power, stamina and sustained performance, are today more powerful and more rigid than before.

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*This Cincinnati Heavy Duty Shaper operated for the 10 days of the Machine Tool Show on a 2" depth of cut, .030" feed, and nine strokes per minute—in 1020 Steel to show the remarkable cutting capacity and rigidity of Cincinnati Shapers.

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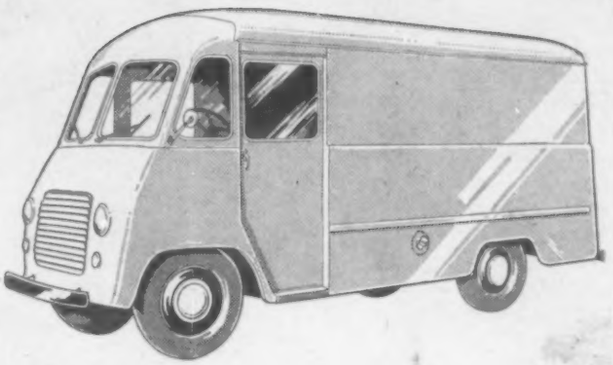


Vanette body forms hood, grille, instrument panel and windshield structure when mounted on a Ford chassis. Built with 134-, 122- and 103-in. wheelbase, all front and rear ends are alike but side panels and roofs are drawn in three lengths over the same basic dies.

Homemade Presses Build Vanette Truck Bodies

Surplus aircraft channels and ingenuity are principal ingredients of homemade presses to build delivery truck bodies

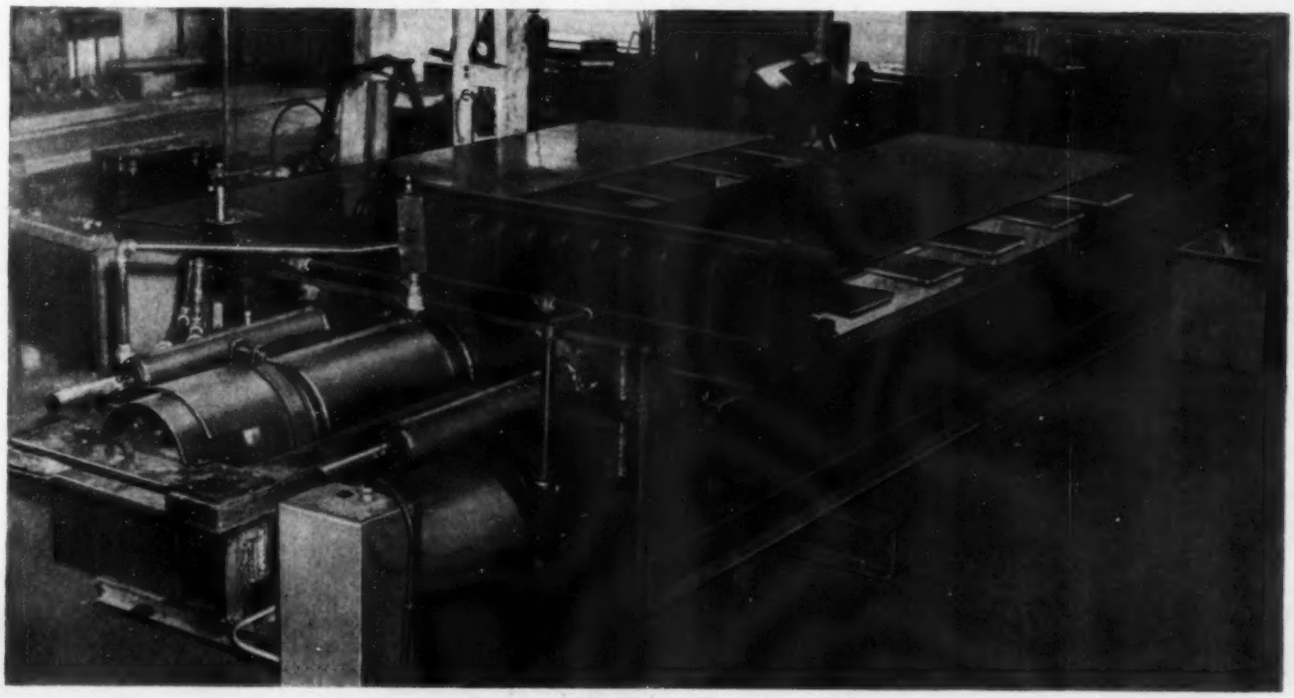
BY CHESTER RICKER, DETROIT EDITOR

VANETTE delivery bodies for Ford trucks were made before the war by Brooks and Perkins. When production was halted, the company went into the magnesium fabrication for which it is now well known.

After V-J day, when they planned resumption of the Vanette, their shop was filled with magnesium production and other means had to be found. Vanette, Inc. was formed and the Correct Manufacturing Co. of Delaware, Ohio undertook the job of producing the unit.

In addition to production of the body, the Ford chassis must be changed to a cab-over-engine type. Both operations involved problems that seemed insurmountable. When G. W. Way, president of Correct, started on the project late in 1945, presses suitable for the body could not be obtained in less than 24 to 30 months. New steering gears, pedals, malleable iron brackets and forgings were needed at a time when established manufacturers were taking all the production available.

Utilizing surplus war material which was on hand, hydraulic presses were built in the plant. When it developed that stretcher-leveled sheet



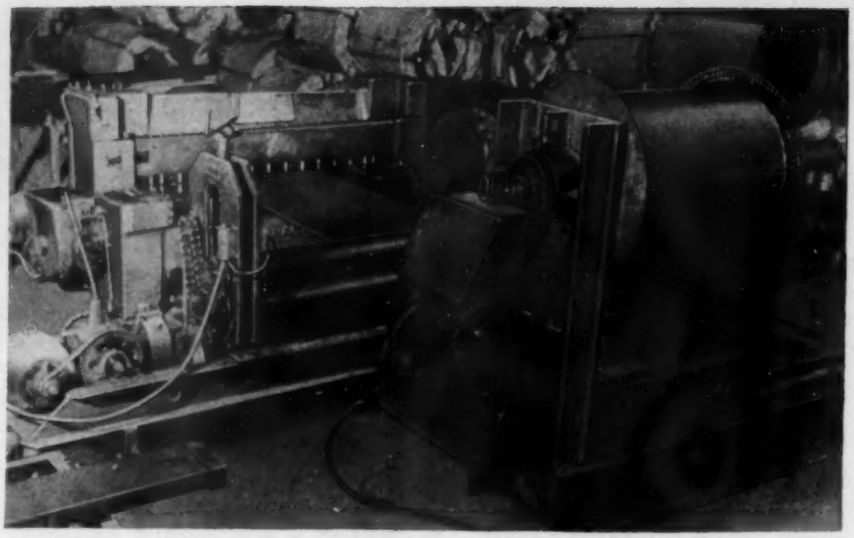
BUILT IN LESS THAN 30 DAYS, this hydraulic sheet-steel stretcher is made from boiler plate and angle iron to level 4x16-ft. 16-gage steel sheets. The single 14-in. dia. cylinder operates under about 500-lb. hydraulic pressure, leveling up to 80 sheets an hour

needed for the bodies was only available on the black market at prohibitive prices, Way bought steel by the roll, cut it to size and stretcher leveled it on a homemade press.

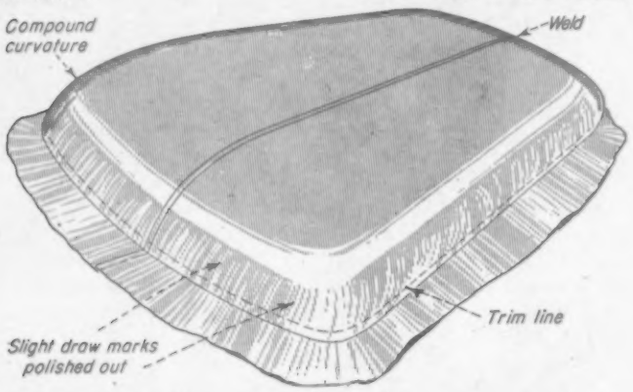
All of the personnel were hired and trained in the plant while the manufacturing and material obstacles were being solved.

This job, the writer feels, could not have been done by a large corporation. Its success lies in the efforts of one man who knows every man and every job in the shop. Worker suggestions can be appraised and put into effect at once when they are desirable. Modifications of machines can be made quickly without resorting to committees or drawings.

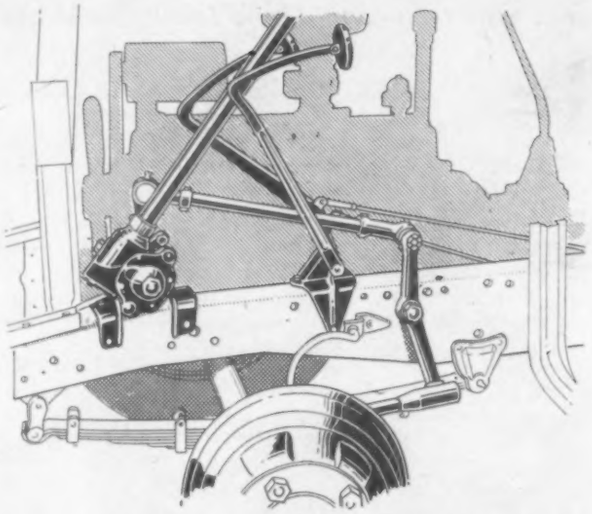
The pictures on these pages show how this shop met some of the problems involved in producing the Vanette.



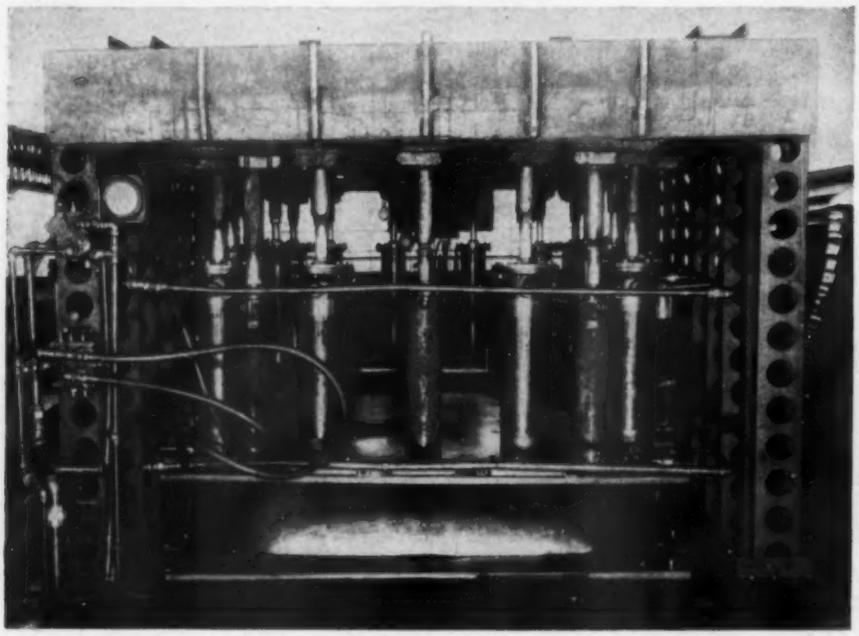
ROLLS OF STEEL as received are mounted on this homemade reel which is electric-motor driven. A triple-roll sheet straightener and feed has an auto transmission to give a variable-speed drive for the feed rolls. A Niagara shear cuts off the 16-ft. lengths of straightened steel strip



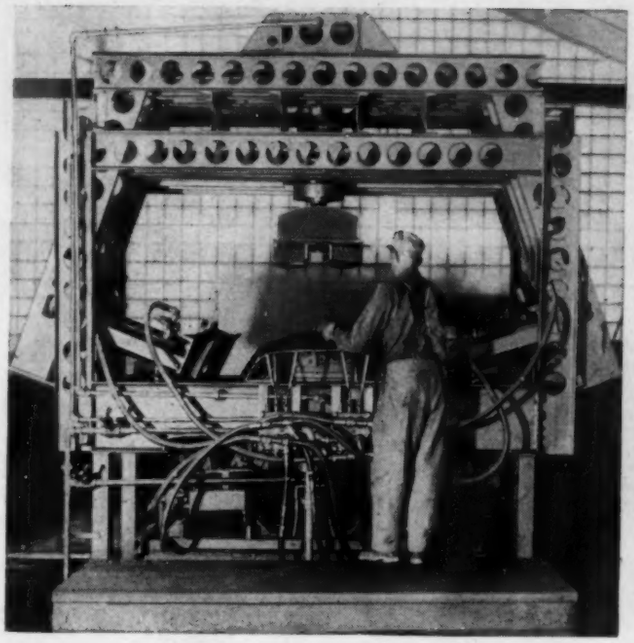
FORMED IN ONE OPERATION on a homemade hydraulic draw press, the 16x6-ft. roof is a difficult job for all four corners have a compound draw. The big sheet from which the tops are made is formed from two 4x16-ft. stretcher-leveled sheets tacked together and ribbon welded down centerline. Flash is trimmed off with electric shears



FORD V-8 truck chassis has to be modified to convert it to a cab-over-engine type. A new bracket is provided for brake and clutch pedals, a walking beam pivoted at the old steering-gear position transfers steering action from new steering gear located ahead of the front axle. These modifications are made after standard units are removed



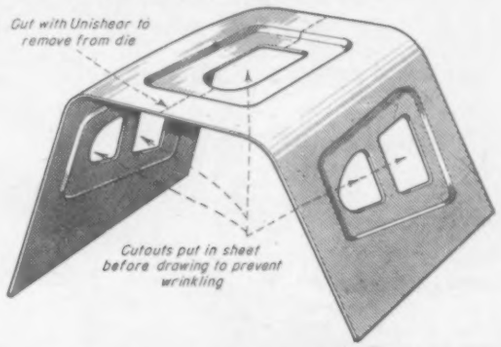
HYDRAULIC DRAW PRESS is made up with 22 8-in. dia. and three 4-in. dia. hydraulic pressure-plate cylinders. In this view the pressure plate has been lifted hydraulically to allow inserting the sheet from the end. The draw ring is then lowered, the sheet clamped hydraulically. Pressures at the corners are increased by closer spacing of hydraulic cylinders. The die is carried on eight 14-in. dia. hydraulic cylinders in a pit beneath the press. By manipulation of these cylinders a 14¾-in. draw is made and the corners formed so well they require no hand reworking

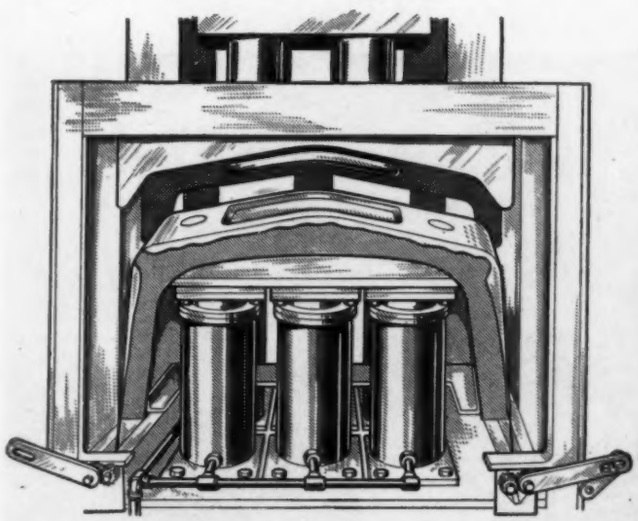


SALVAGED aircraft steel channels assembled in position and torch welded together form the hydraulic press where the windshield and both side windows are formed. A U-shaped sheet is placed over a fixed die block. Grippers catch the ends and hydraulic cylinders beneath the bed stretch the sheet over the die block while rams on each side form the windows and an overhead cylinder with die forms the sides of the windshield. Spring-loaded pressure plates are used for each forming operation

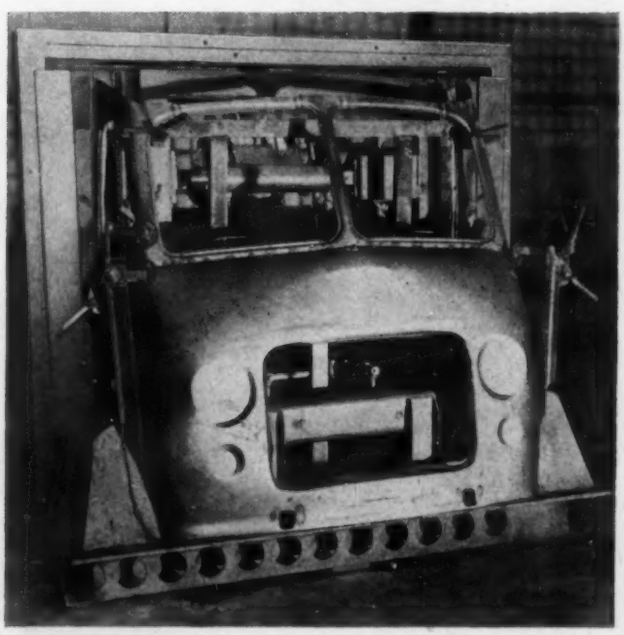
ARC WELDING INSERTS to the windshield pressings forms the upper windshield structure. The operator welds parts together in a locating fixture in which the various units are clamped in correct relationship

WINDSHIELD AND WINDOW section has holes precut in the flat sheet with an electric Unishear before it is put in the press. A templet marks the shape and position of the holes before cutting. These holes plus the spring-loaded pressure plates attached to each diehead prevent wrinkling on these draws. The sheet is slit across the center to remove it from the press



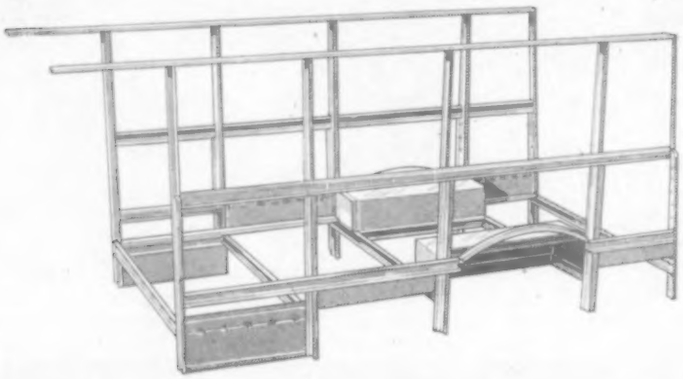


LOWER HALF of front body section is formed by another stretcher press with six hydraulic cylinders 14 in. in dia. Then the four top cylinders press the upper die on the stretched sheet to form the radiator grille panel, also head and parking light embrasures. A piece of round cold-rolled steel bent to shape forms the radiator-opening forming punch attached to the upper die

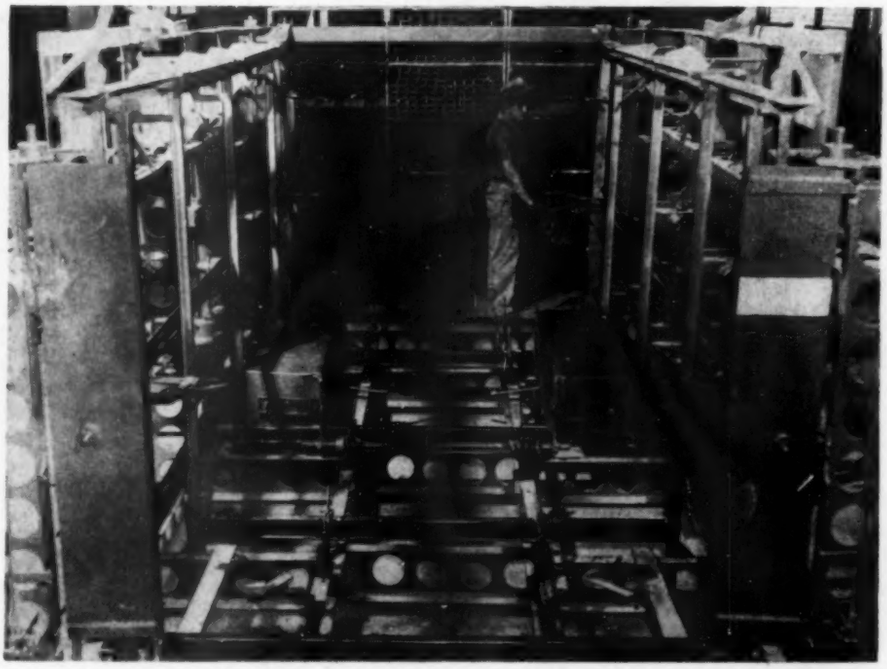


CLAMPING FIXTURE for forming the front end of the body holds parts while they are electrically tack welded. It is torch welded on a pick-up fixture

BODY SIDE PANELS have ends formed in another of the homemade hydraulic machines



WELDED FRAME of the "Vanette" body after removal from the welding fixture. On this skeleton are electric and gas welded the top, floor, side panels, rear door unit and front assembly



LIGHTENED CHANNELS used throughout the plant form an assembly fixture for the body framework

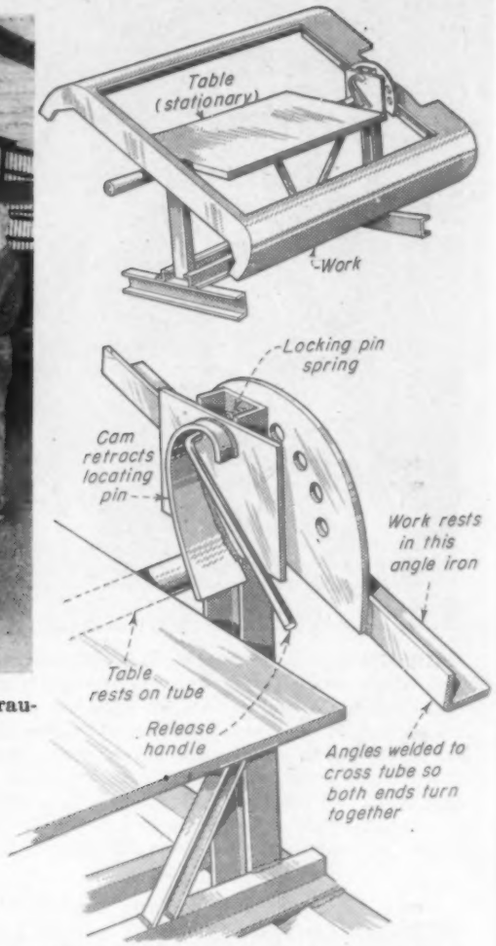
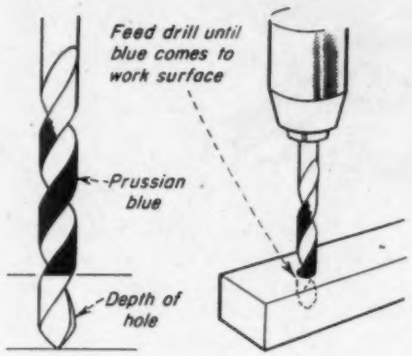


Table (stationary)
Work
Locking pin spring
Cam retracts locating pin
Work rests in this angle iron
Table rests on tube
Release handle
Angles welded to cross tube so both ends turn together

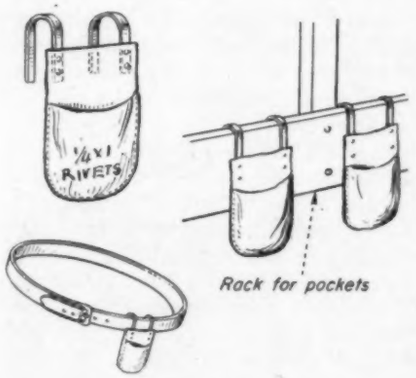
ASSEMBLY FIXTURE made up with a torch is typical. It supports the rear corner panels and the pieces that form the rear door opening, tilt to weld this bulky unit conveniently. The fixed table in the center is for tools or parts and saves much handling time

Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

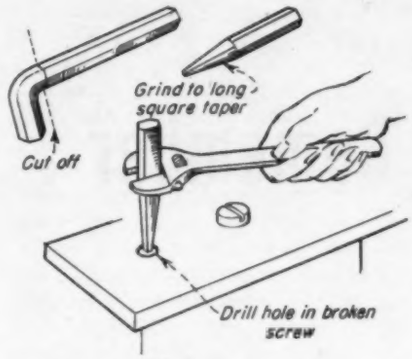


WHEN A FEW HOLES are to be drilled to a specific depth, it may be easier to use prussian blue as a "depth stop." Measure back from the point and apply the blue to the balance of the shank. When drill penetration is correct, the blue demarcation will come level with the work surface.

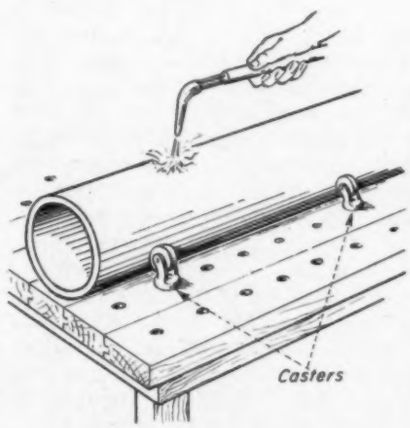


MEN CURSE at pockets, but can't get along without them. The detachable pocket is a handy item, especially to those engaged in various kinds of assembly work where only a few items of a kind will be needed. Make pockets out of canvas as shown. Label them as to content and fill with the corresponding screw, nut, rivet, cotter pin or what not. Hang the pockets on a convenient rack. The operator takes the wanted pocket from the rack, hangs it on his belt, does the job and returns the pocket to the rack. This avoids accumulating a scrap pile in one's pockets and the wanted material is always conveniently at hand.

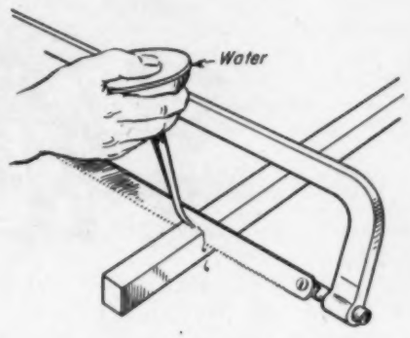
IF SCREW EXTRACTORS are not at hand, make one from a worn or broken wrench for hollow-head setscrews. Grind off the hooked end, being careful that the end of the shank is square. Then grind the flats to a long taper. Drill the usual hole



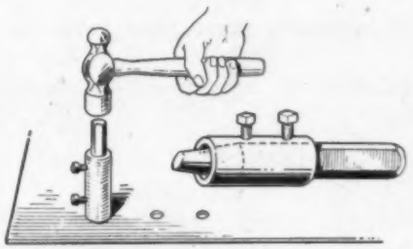
in the broken screw, drive in the point of the home-made screw extractor. The sharp edges of the flats take a good bite—a much better one than can be obtained with the tang of a file.



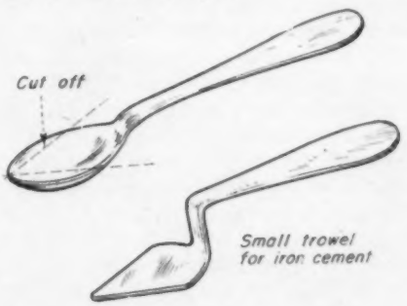
BIG SHOPS use roll-over jigs and similar appliances for positioning welds. For the occasional job, the same idea can be applied thus: Drill ¼ in. holes in the bench top and stick casters into appropriate holes for the job. Lay the cylindrical piece on the casters and rotate it as you will while welding or brazing. This idea will save a lot of time and make for better welds.



WATER IS the best lubricant when sawing tin, babbitt, lead and similar soft metals. Apply the water with the usual oilcan to keep the dust moving freely out of the cut. Water also helps to prevent plugging up the teeth of files when working on these materials.



HAND PUNCHING of sheet metal often results in rivet holes that are too large or too small. To overcome this, slip a short length of tubing over the handle of the punch and fasten at correct distance from punch face with two setscrews. The tubing acts as a stop, the holes will be sized automatically.



OLD SPOONS make fine little trowels for applying compound to crevices or filling up unused holes. Flatten the spoon bowl, cut to a point, and bend the shank to suit.

I Remember, I Remember . . .

With only antiquated equipment available, patience and plenty of ingenuity were used to solve a difficult machining problem

NAME WITHHELD

YOUNG SHOP MEN are so thoroughly accustomed to operating the very finest and latest types of machine tools that they can scarcely credit conditions under which some oldtimers used to work.

Back in the days when speed changing was universally accomplished by flipping a belt from one step to another on cones, I went to work at a once rich, but then dilapidated, gold mine, some 40 hard mule-back miles from Leon, Nicaragua. The title of Jefe Mecanico, thrust upon me, was not too flattering, for the shop was a one-man layout. The man I replaced had stayed too long down there and had gone practically native. It had long been beneath his dignity to work in the shop, and everything was left to inexperienced natives. He sported a big belt and a .45 revolver on the job, and lived in a world of imagined grandeur as long as there was anything left in his quart bottle of native *guara*. When finally shipped out of the country, he was wearing sandals and a machete.

The only grinder in the shop was a big, hand-driven grindstone, elliptical in shape, and used mainly by the wood choppers. The method employed was to rest the foot on the crankhandle, and rub the axe or machete on top. The lathe was English, the shaper German, and the drill press of unknown origin. Everything was rusted, many parts broken or lost, and the jungle growth almost inside the shop, which was open on three sides and formed a fine playground for big lizards and occasional snakes. The nearest thing to high-speed steel was a bar of oldtime Mushet steel, terrible stuff to forge, and although I did, later, get some toolbits from San Francisco, I was obliged, at times, to make up tools from miners' drill bar.

But when things finally got going, I did enjoy the luxury of a unique speed control. The lineshaft was driven by an old mine hoist engine without a governor, and a faithful, colored Jamaica man, who was stationed at the throttle and doubled as interpreter. A system of hand signals was worked out so I could run the lathe, wave a hand in the air, and get just the speed I wanted. Within reason, that is, for full throttle speed on a good head of steam might have crowned me with a flying pulley section or even the entire lineshaft. I felt much as would an amateur magician who put his hand in the hat and found a live rabbit actually there. The engine also had double eccentric link motion and reverse lever, although this did not at first appeal to me.

Much of the mine equipment had been built in Europe, and one job that faced me was the replacement of a part made with a metric thread —and no change gears for the lathe to suit. Ordering parts by mail meant months of waiting (boats from San Francisco took three weeks one way), so I decided to make a special change gear to fit the leadscrew and turn out a sufficiently accurate pitch thread for the job. Not having conversion tables or data to hand, I put the broken threaded part into the female member in which it operated, unscrewed it until travel measured 1 in., and with the starting and stopping points marked, I had the number of threads plus a fraction. The fraction was measured as nearly as possible from the starting and stopping lines extended on the screw.

Hardwood Gear

That night, ignoring the bugs flying around and into the kerosene lantern, I worked on the problem until I had figured out the nearest gear size and number of teeth I could arrive at. Next day, I turned up a disk from a beautiful piece of hardwood to the diameter at the bottom of the teeth, allowing for shrinkage and giving a generous taper across the face to allow for draft, and also scratching a fine line on the side of the rim on which to space off the teeth. Spacing off the teeth with sharp-pointed dividers

was just a painstaking job, as also was the extending of lines to the outer circumference and drawing parallel lines there to indicate the bottom of each tooth space.

Meanwhile, the native carpenter, a very fine hand workman, was planing up strips of hardwood to a slightly oversize templet of tooth section. Luckily I had some small files in my kit and was able to file out a tooth-section shaped hole in a piece of thin, flat steel. The partly finished strips of wood were then tapped through this improvised shaving die, smoothed up, cut to length, and glued in place, watching the lines scribed on the disk face.

Flask Details

A two-section dowelled flask was then made up. My knowledge of foundry methods was a little more than casual (my Alma Mater was a foundry and machine works), but here substitutes had to be used. An oldtime skilled adobe brickmaker was appealed to, and produced a pumice-like sand and finely powdered clay which, when mixed and slightly damp, had good cohesion. After a couple of trials, and remixing and changing material proportions, I succeeded in drawing the pattern out pretty clean and slicking up a nice-looking mold.

Scrap bronze was melted up in a crucible, borrowed from the assay office, in a built-up charcoal fire on the blacksmith's forge. The resulting casting was pretty rough, in fact it had whiskers, but the teeth were all there, and after some filing they meshed nicely with the mating gears. As usual with old lathes, the gears were of comparatively coarse pitch.

When machining to fit the leadscrew, and facing the hub and rim, I was struck by the fine rich color of the casting and could not resist shining the whole thing. That's where I made a mistake, for soon the natives were coming singly, then in parties, to see the "wheel of gold," convinced that if it were not solid gold, at least a good-sized hunk must have been in that crucible from the assay office. I had to hide the thing at night.

Now I was ready to tackle the thread-cutting job. On account of the queer ratio between the pitch of he metric thread and the leadscrew, there would be a problem of catching the thread at the start of each successive cut. I considered marking the starting point of the carriage and the meshing teeth of the gears, and then, after each cut, with the carriage in place and the nut out, dropping the gears out of mesh and turning until the same marked teeth came right, then engaging the gears and starting again, after dropping the nut on the screw. That is, until I looked at the mine hoist engine again and remembered the reversing feature. The engineer and I rehearsed the new signal reverse system. Then, at the end of each cut, at a shake of my head, the whole shop ran backwards at an added clip, the leadscrew nut remaining engaged.

The resulting thread checked closer than I had dared to hope, and that night as I walked up the trail to the hacienda where a few gringos quartered and ate, I was conscious of a new feather in my cap.

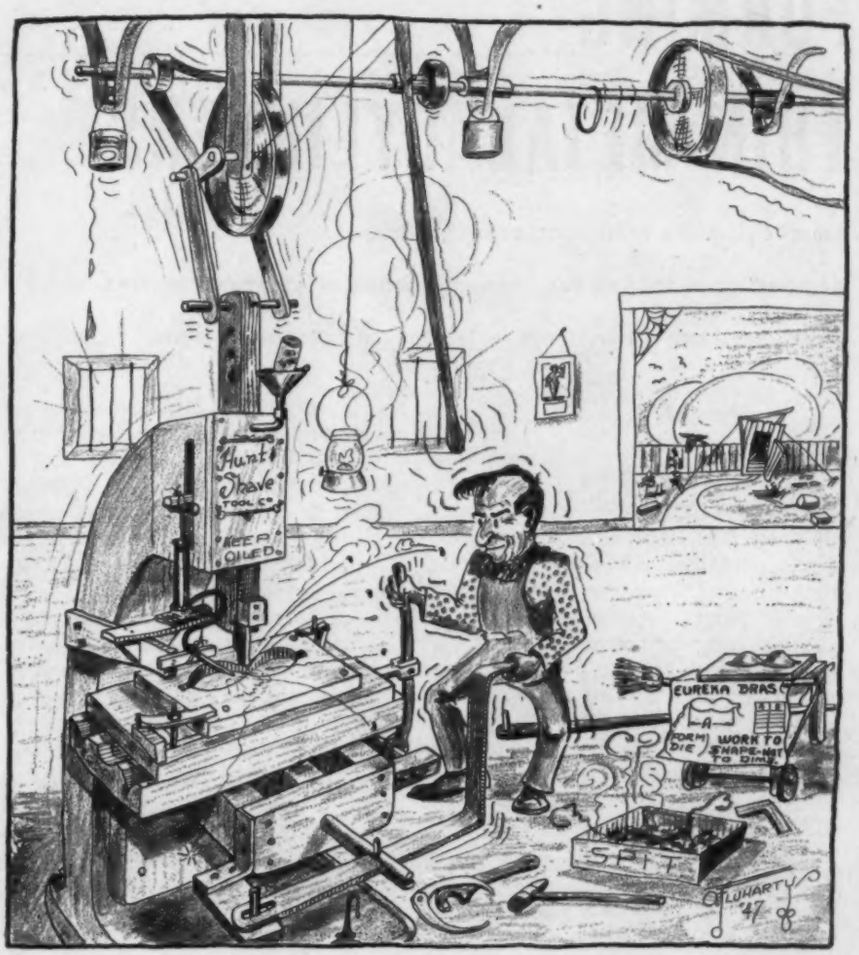
I should like to be able to relate that, as a result of my efforts, great buckets of gold were soon pouring out of the mine, but I must stick to the truth and admit that my masterpiece was never put to use. Such enormous quanities of hot sulphur water were encountered that the mine had to be shut down, and it really seemed, as one of the Irish mine foremen put it, that we had finally tapped one of the springs of Hades.

During the war, I went back to work at the Hamilton Field Air Base with a million dollars worth of equipment available. One of my jobs was the making of some parts for removing and replacing spark-plug bushings, and again metric threads were required. This time, however, gears were obtained to fit a reversible Bradford lathe, but while the resulting job was incomparably better, I didn't get the same kick out of it as when I was on my own.

Gray Iron Machinability

HARD EDGE is not a necessary evil in gray iron castings, according to T. E. Eagan, chief metallurgist, Cooper-Bessemer Co. With proper design, control of the analysis, and proper practice hard edges in the castings can almost always be avoided. The lower tensile irons are much more machinable than the higher tensile irons.

OUR SHOP . . . 31 — *Precision Dies Dept.*



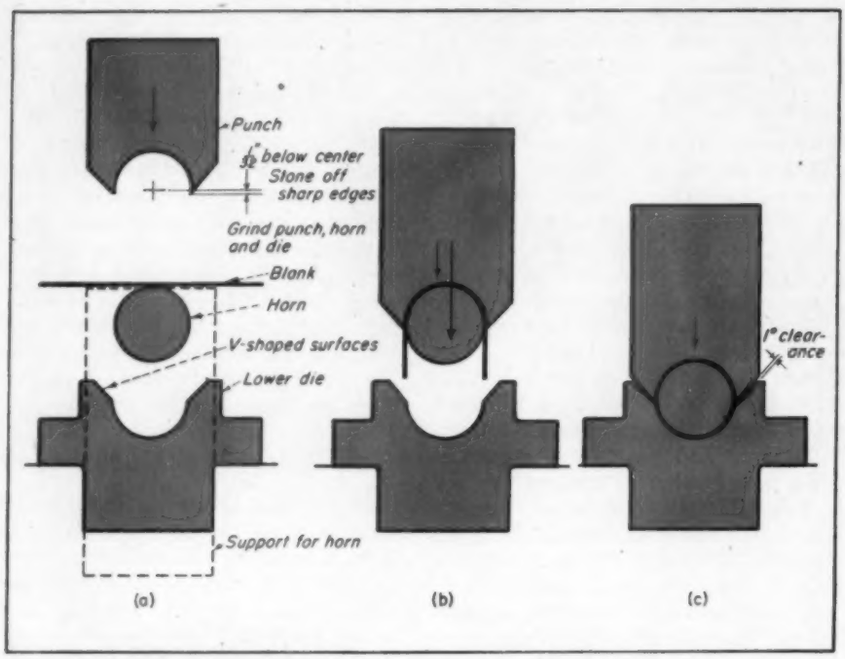


FIG. 1—Forming of small tubes is easily done by positioning the blank on the horn, view (*a*), bending V shape by a concave punch, view (*b*), and bottoming horn in die, as in (*c*), to bring *V* branches together and to strike hard all over to prevent springback of metal

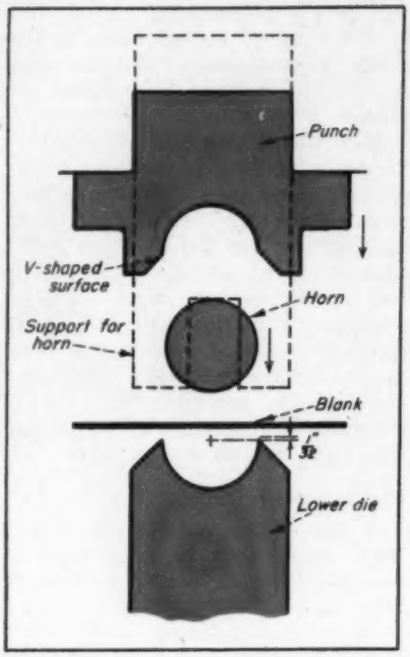


FIG. 2—Inverted die works on the same principle as the upright die. Punch and horn descend together. The blank is bent V shape as the horn bottoms, then is bent around the horn by the punch. This die is used when feeding the blank under the horn is more convenient, because of construction of other die parts, than feeding over it

FORMING THIN-METAL CYLINDERS

Small cylinders with open or lock seams demand good tooling for economical and efficient production. Given here are a number of extremely successful designs

BY WALLACE C. MILLS,
ROCKFORD, ILL.

SMALL CYLINDERS up to 1½-in. dia. and 7-in. long are required in spools, containers and many products of thin metal. Forming them in dies is not difficult when job lots are small so any of the usual methods is satisfactory, but for quantity production the best tooling is important to economical production. Study of best methods is helpful in any case.

The best methods can be found by analysis of tools that have proved successful. Examination of tool designs reveals that few different basic principles are involved, but there has been considerable development of these principles.

One principle—bending over a horn to U shape and bottoming to close the U—is so important that it deserves special attention. It takes care of all kinds of structures ranging from simple open cylinders through lapped-joint tubes and lock-seamed cylinders. Different cases may involve modified design, depending on whether the blank is fed to the die by hand, cut off from strip stock in the die or blanked out in the die.

Types of dies differ also for long and short tubes, and die design, as usual, depends on the quantity. But nearly everything can be covered by tracing the development of the single, sufficient principle.

Butt-joint and lapped-joint cylinders are formed in dies in one operation. Lock-seamed cylinders can be formed in dies too in a series of operations, but forming in can bodymakers is usually the better way when tube size and stock thickness are within range of machines.

Range of standard bodymakers is about ⅞-in. in dia., 8 in. in length and about 0.016 in. in stock thickness. Special bodymakers handle other sizes and tube-making machines make quite long tubes. Dies can be built for thin stock or thick stock, small diameters, square corners, in fact, almost anything.

Forming thin metal differs from forming metal of say 1/16-in. thickness, because thin metal bends easily. It can be bent over a horn supported on springs and then forced down into a die to complete the forming.

This principle is used mostly for thin stock, but it is used for heavier metal too when the blank is not too stiff for bending against spring pressure. But for thin metal there is a definite advantage. The horn can be supported at one end only, or at both ends if desired, without placing un-

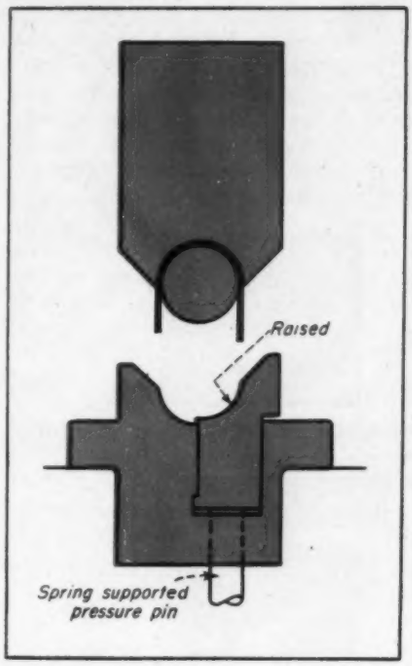


FIG. 3—Lap joints require modification of die because edges must be overlapped. The blank is bent with a long leg that strikes the raised part of the die which forces it against the horn and folds it underneath the other edge

due strain on the horn and the work can be stripped from the free end of the horn.

Forming Tubes Over Horns

The principle used most for forming small short tubes in dies is shown in Fig. 1. A flat blank is bent U shape over a horn by a concave punch. Then the horn and U-shaped blank are pressed into a die with inclined V-shaped surfaces for bending the branches of the U together so they enter the lower die where they are wrapped around the horn.

When the die is closed, the cylindrical form is completed and the metal is struck hard all over to set it and avoid springback. Striking hard against hard surfaces all around is important for thin metal to hold a well defined shape.

So the metal may be struck hard, the horn and upper and lower forming dies must be of tool steel hardened and ground. In order that the U shape may be formed without spreading the branches of the U, the concave punch is built so the sharp edges of the punch extend 1/32 in. below center to allow for wear and rounding off of sharp edges. Also, the upper and lower forming blocks close tightly around the horn with 1° angular clearance.

In Fig. 1, the blank is on top of the horn. It is fed by feeding strip stock over the horn and then cutting off, or by feeding sheared blanks over the horn. Feeding the blank over the horn and bending down is the most common method, but in some cases the die may be inverted, as in Fig. 2.

In the inverted die, the blank enters under the horn, is bent upward to U shape by the horn and finally is closed around the horn by the punch. Preference for the inverted type depends on whether it is more convenient to feed the blank over or under the horn.

Fig. 1 and Fig. 2 are for butt-joint tubes. For lapped-joint tubes, the design should be modified as in Fig. 3, because one edge of the blank must be tucked under the other edge. Overlapping of the edges is accomplished by making one branch of the U longer than the other and changing the die design so the long branch strikes a raised section of the die which forces it against the horn while the shorter branch is formed outside in overlapping position.

The raised section of the die is

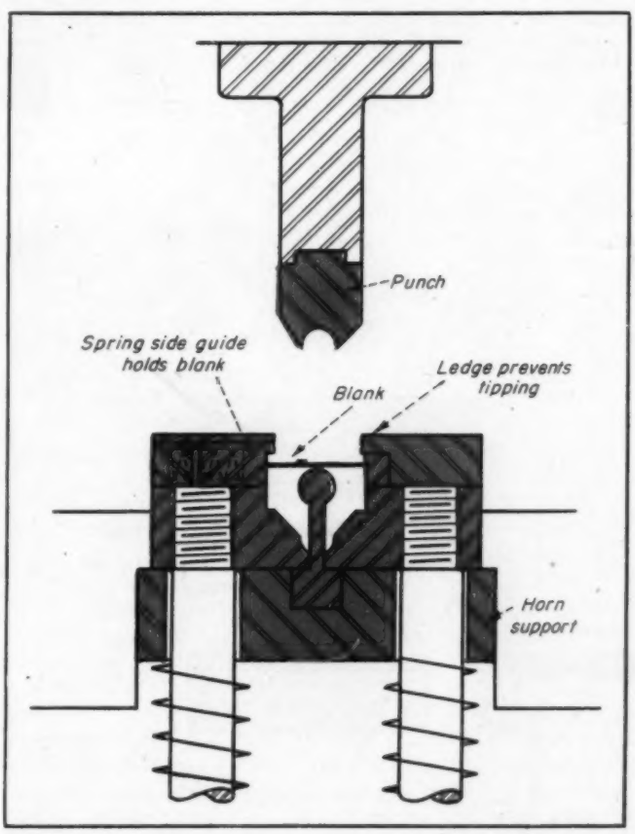


FIG. 4—Open tubes permit use of a web to strengthen the horn. Side guides and ledges retain blank on horn and keep it from tipping

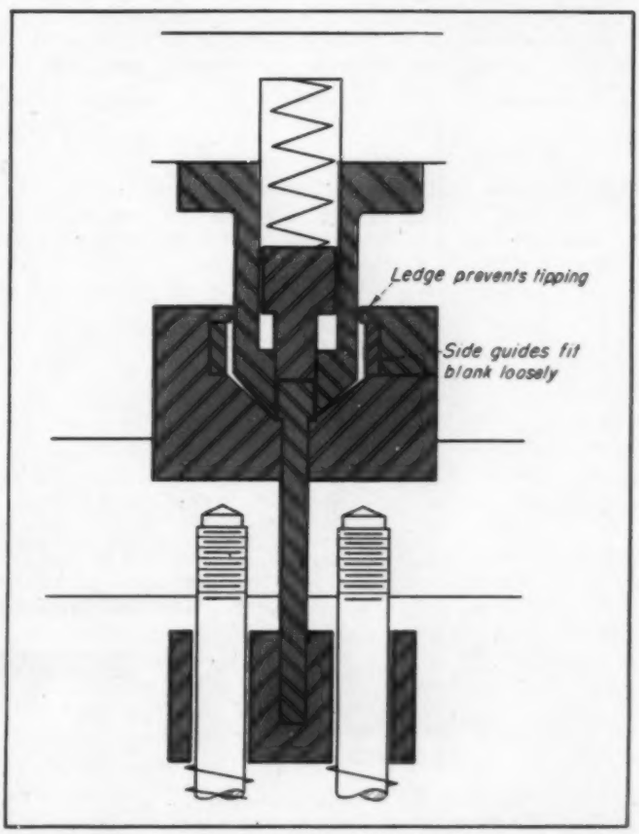


FIG. 5—**Open tube die,** with strengthening web, side guides and ledges, forms square tubes narrower at bottom than at top to compensate for springback

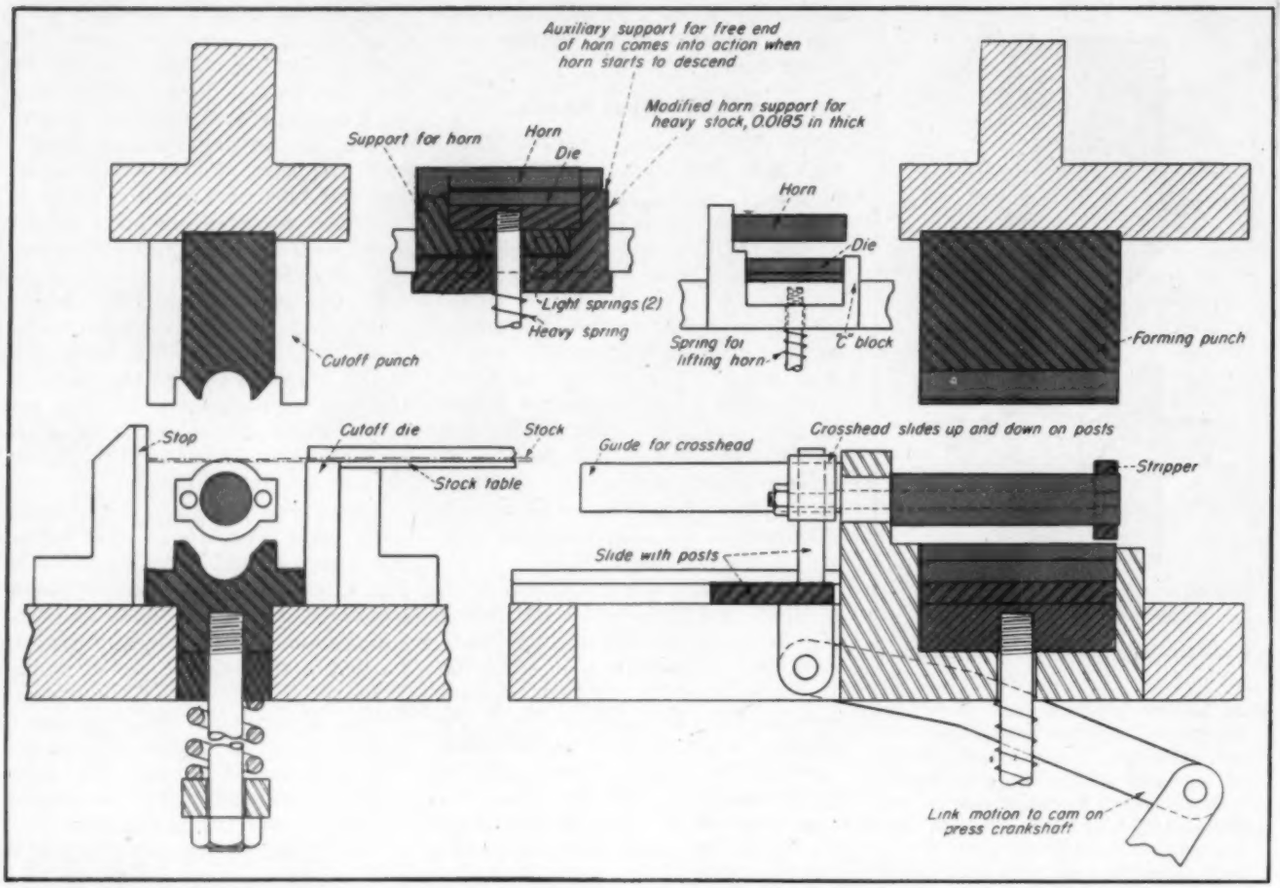


FIG. 6—Long butt-joint cylinders are formed in this die from strip stock. The stock is fed against a stop, cut off, formed around the horn and stripped by a stripper actuated through linkage from a crankshaft cam. Modified design for heavier stock supports the horn at both ends during forming, with the free end engaging an auxiliary support. The heavy spring, after the U-shape bend, yields to permit bottoming the horn into the die

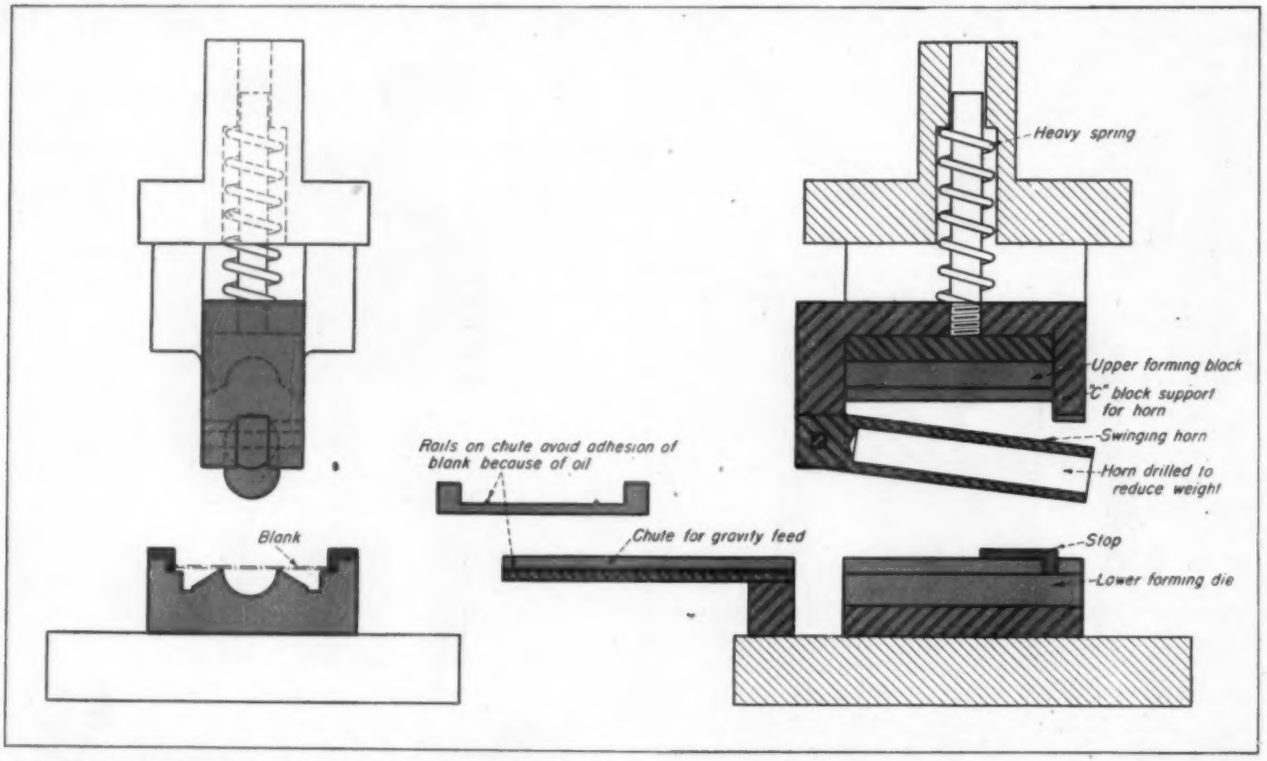


FIG. 7—Gravity-feed die is hand-fed sheared blanks which slide against a stop and are formed by descending horn and punch. As the horn rises, one end swings down so the formed cylinder can slide off by gravity

supported on springs, and the horn has clearance cut in the bottom to take care of the two thicknesses of overlapping stock. Welded structures can be made from lap-seamed tubes if one overlapping flap has raised nibs for projection welding.

If a tube is not overlapped but has an opening of substantial width, as in Fig. 4, advantage can be taken of the opening between the edges of the blank to stiffen the horn by a web underneath it. Fig. 5 shows a similar stiffening web, but it illustrates also the possibility of forming a tube with square corners.

In both dies, blanks are retained by guides and ledges above the horn and blank to prevent tipping. One guide can be spring pressed against the blank, Fig. 4, to retain the blank by friction when it is carried in forcibly. Or, if the blank is dropped into the die, the guides can fit the blank loosely, as in Fig. 5.

Tube Forming from Strip Stock

A complete die for forming a butt-joint cylinder, according to the principle of Fig. 1, is shown in Fig. 6. The design is for cutting off a blank from strip stock and forming a relatively long cylinder of small diameter.

Strip stock is fed by hand from a table over the horn until it strikes a stop. The blank is then cut off, bent downward over the horn and formed cylindrical. The cylinder is picked up by the horn on the upstroke of the press and stripped off by the stripper.

The stripper derives its motion from a slide forward and back by link motion from a cam on the press crankshaft. Link motion is used when the travel of the stripper is long. For short cylinders, a simple inclined cam mounted on the punch holder would be better, but the inclined cam would be too steep for long strokes.

The horn in this die is supported at one end only on a C-shaped sliding block held up by a spring underneath the die. Springs are always, whenever possible, located underneath instead of within the die, so long springs can be used and also be accessible.

Design of the C block support for the horn can be modified for heavy stock so the horn is supported at both ends during forming but still be free at one end when the work is being stripped. In this design, the free end of the horn engaged an auxiliary support as soon as the horn starts to descend.

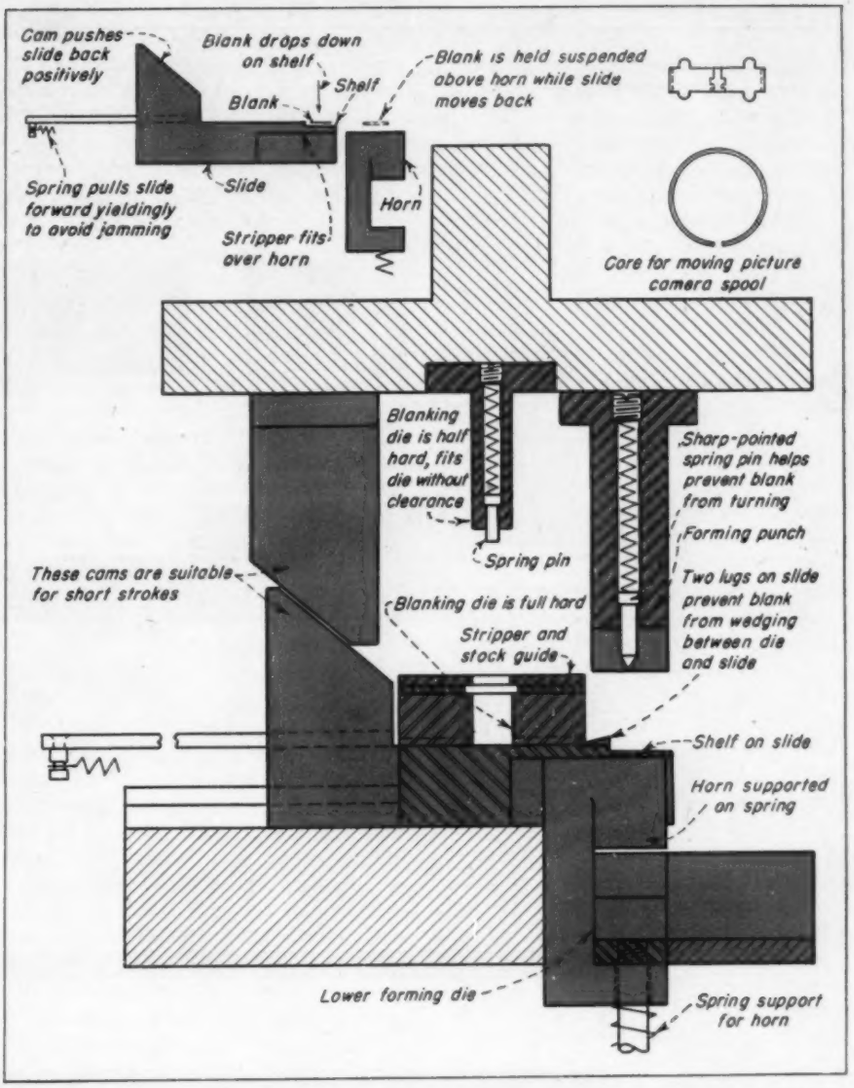

Cam pushes slide back positively
Blank drops down on shelf
Shelf
Blank
Blank is held suspended above horn while slide moves back
Spring pulls slide forward yieldingly to avoid jamming
Slide
Horn
Stripper fits over horn
Core for moving picture camera spool
Blanking die is half hard, fits die without clearance
Sharp-pointed spring pin helps prevent blank from turning
Forming punch
Spring pin
These cams are suitable for short strokes
Blanking die is full hard
Two lugs on slide prevent blank from wedging between die and slide
Stripper and stock guide
Shelf on slide
Horn supported on spring
Lower forming die
Spring support for horn

FIG. 8—Cut-and-carry die blanks stock and carries blank, by spring-actuated transfer slide, along to the shelf over the horn. As ram descends, transfer slide is moved back by cam action, leaving blank suspended over horn and held by spring pin, ready for forming to its cylindrical shape. Two lugs on transfer slide mesh with grooves in the die to prevent blank from wedging between die and slide

The horn is attached at one end only to a C block on light springs, but these springs yield as soon as the blank starts bending. The horn and its C block support come down solidly upon the auxiliary support which rests on a heavy spring. This spring is heavy enough for forming over the horn, but yields after the U shape has been formed.

A complete inverted die of the kind referred to in Fig. 2 is shown in Fig. 7. This is an inexpensive gravity-feed die for an inclined press. Blanks are dropped by hand into a chute provided with rails so they slide freely into the die without hesitating in the chute because of oil adhesion.

They slide under the horn against a stop. When the horn descends on the blank, it swings on its pivot until supported at both ends by the spring-pressed C block in the punch. After forming, the horn drops down so one end is free and the cylinder slides off by gravity, no stripper being used.

The press is run intermittently, stopping after each stroke unless the operator is clever enough to drop the blanks in at exactly the right time. Although this die is economical to build and satisfactory for many purposes, positive stripping is faster.

Cut-and-Carry Dies

Cut-and-carry, or progressive dies, can be provided with roller feeds and automatic stops for the punch press in case of jamming. Moreover, they can be run continuously if stock

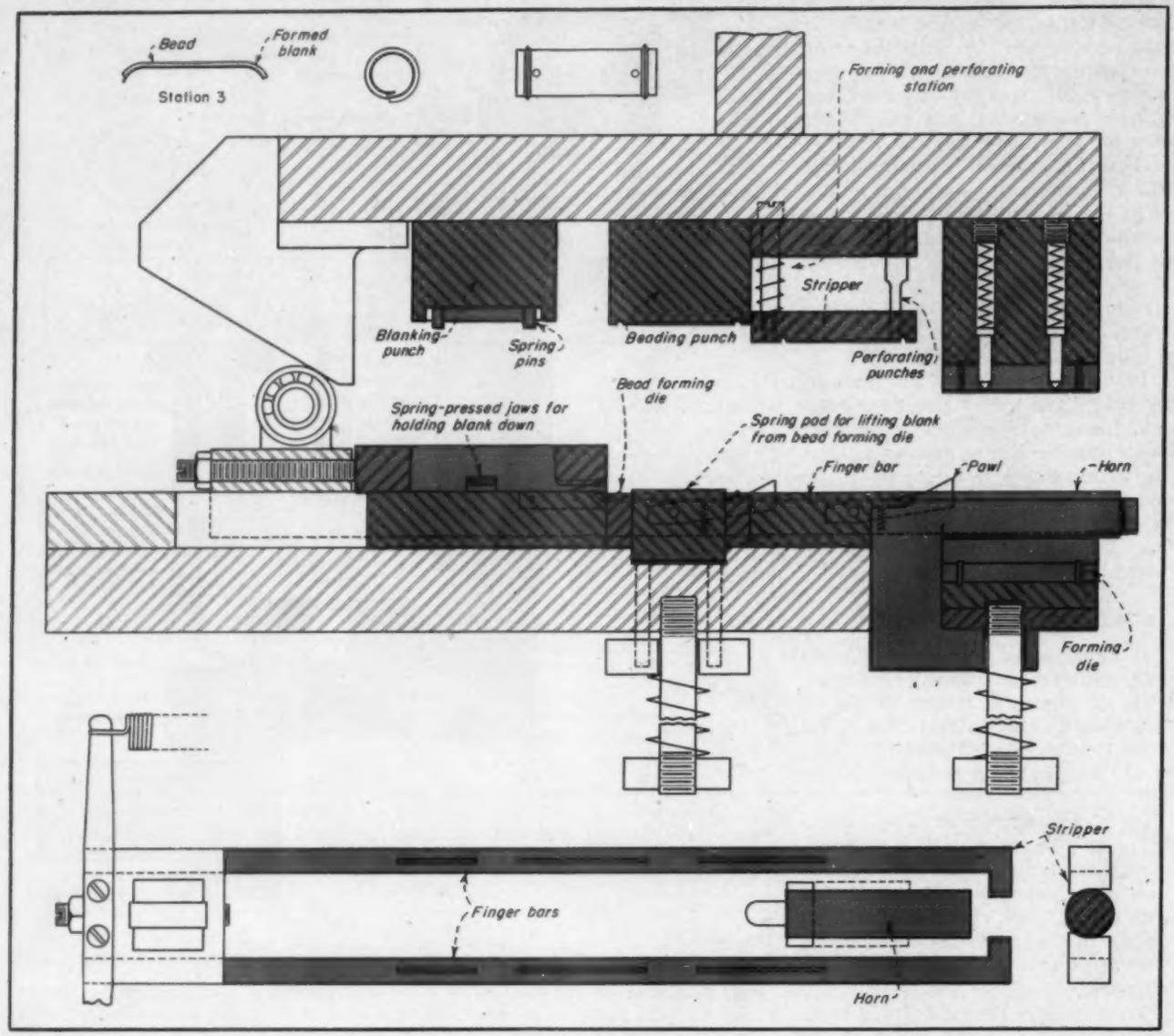


FIG. 9—Multi-stage cut-and-carry die forms a beaded cylinder in 4 stages—(1) blanking, (2) beading, (3) perforating and preliminary forming to arc shape and (4) final forming over horn. Transfer feeding is accomplished by spring-actuated finger bars, while pawls prevent backward motion of blanks

is fed by hand into the first stage.

A cut-and-carry die for blanking and forming a short barrel for a movie-camera spool is illustrated in Fig. 8. The blank is cut out, pushed through the die by spring pins in the punch and held down by tapered spring stripping jaws in the die so it cannot come up with the punch.

The die is hard, of oil-hardened steel, with ¾° taper clearance running clear to the top of the cutting ring. The punch is semi-hard, of water-hardening steel toughened by hardening in oil and peened to fit the cutting ring without clearance, all according to the usual practice for blanking thin metal.

After the blank has been sheared, it drops down onto a shelf on a transfer slide and is carried from beneath the blanking die to the forming station. Both transfer slide and blanking die are built so the blank cannot become wedged between slide and die. Lugs on the slide intermesh with grooves in the die to prevent the wedging.

The transfer slide is moved forward yielding by springs and returned by positive cam action, as is usual to avoid jamming if the blank does not move forward properly. The blank is carried forward over the horn and is retained in suspended position above the horn while the slide moves back from underneath the suspended blank.

Before forming, the blank is pushed into contact with the horn by a pointed spring pin in the forming punch. The pointed pin helps prevent the blank from slipping on the horn. After forming, the cylinder is stripped from the horn by the same blank-carrying slide which fits over the top of the horn.

Cut-and-carry dies can have more than two stations. The multi-stage die of Fig. 9 has four. They were required for forming the lapped-joint spool core shown with beads adjacent to each end. Beads are formed in the second station and, in the third station, the blank is formed preliminary to forming to cylindrical shape. In this particular case, perforating is combined with preliminary forming in the same station.

Preliminary forming of the blank by bending the edges to arc shape, as shown at the third station, is necessary to form the blank truly

cylindrical. Otherwise, the blank would spring back because of bead stiffness and edge portions of the blank would be slightly flattened.

Preforming of blank edges in the same way helps in other kinds of work. Very small tubes will come more round if edges are preformed. And, in the case of lock-seamed tubes, preforming helps in hooking the lock.

For multi-stage cut-and-carry dies, the finger bar transfer mechanism of Fig. 9 is satisfactory. Two bars with spring-raised fingers travel forward and back, and carry the blanks from station to station where they are retained by spring-pressed friction bars and by spring-raised pawls that prevent retrograde movement. The finger bars can be extended to push the blanks along the horn if there is more than one operating station on the horn, as in the case of lock-seamed cylinders.

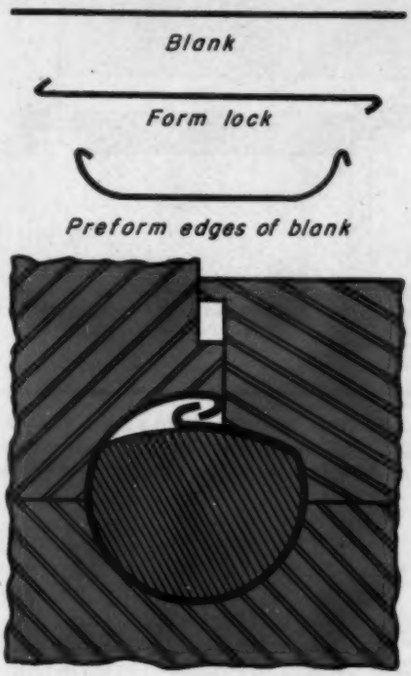


FIG. 10—Lock-seamed tube is formed in a cut-and-carry die in stages shown—blanking, forming lock, preforming edges, forming and locking edges loosely, and bumping lock and rounding tube. Squeezing in last station swells the metal to fit the die and removes any flat spots

Multi-stage cut-and-carry dies have been built for forming lock-seamed tubes. Stages for a 9/16-in. dia. x 3-in. long tube are shown in Fig. 10. The blank is cut out from strip stock and edges of the blank are folded for locking. The blank is preformed, as in the die just described, and then bent around the horn, locked loosely and moved forward to another station for bumping the seam.

The horn is solid because it is so small. An expanding horn would not be strong enough because of sectional construction. Expanding horns are used in can bodymakers for larger sizes.

The preforming operation is needed for small-diameter tubes to make the locking edges of the blank hook together properly. Edges are hooked together after the blank has been bent around the horn, which is provided with clearance at the top to permit the edges to overlap and snap back, locked loosely together. Because of the clearance, the tube is loose on the horn so it can be moved forward by a finger bar.

At the second station, the horn has clearance on two sides so the tube is loose enough for stripping after the lock has been bumped. Another feature of the bumping station is rounding up the cylinder while bumping the lock. The dies squeeze the tube slightly so the blank tends to swell out to the circular shape of the dies. The rounding-up dies take out flat spots in the metal and make the tube truly round.

The same principles of locking over a solid horn are carried into the die, Fig. 11, for forming a carbine rifle magazine of 0.020-in. steel. This stock is too heavy for forming in a can bodymaker. The blank was preformed in a previous operation, fed to the die by hand through a chute in an inclined press and formed, in two stations on the horn, by the principle of the inverted die of Fig. 2.

The blank was never tight on the horn because of clearance at the top of the horn at the first station, and on the sides near the bottom at the second station. Blanks were formed just as fast as they could be fed by hand at 2,500 per hr.

The horn of this die is supported in a C block held up by light springs in the lower die. When the punch descends, the horn bends the blank upward and forms the bottom of the tube at the same time. The horn is pushed down by another C-shaped block in the punch holder that is backed up by heavy springs.

When the horn bottoms in the die so it cannot go down further, the punch continues to descend and gathers together the hooked edges of the blank so they snap into a lock which is bumped slightly to set it. The tube is loose on the horn so it can be moved forward by the transfer mechanism operated through linkage by a cam on the press crankshaft.

The pin type of transfer mechanism shown is a favorite one. Two round pins with tongues slide in grooves milled in the horn. Thus, the pins are well supported throughout their travel. The pins pass through holes in the horn support and are attached to a slide that moves along a guide attached to the horn support. The pins push the blank to the second station of the horn.

At this station, the lock is bumped tight and the upper portion of the tube is formed accurately but the lower portion is free on the horn. The completely formed tube, accurate in size, is pushed off the horn by the incoming blank.

Tube Forming in Bodymakers

When lock-seamed cylinders are made in can bodymakers, they are formed cylindrical, then locked and bumped in a single station in nearly all bodymakers. A blank with folded edges is bent around a horn by wings and locked loosely as in Fig. 12. The horn then expands so the loosely interlocking edges are pulled tight, and a hammer bumps the lock tight. The horn then contracts and the can is loose on the horn so it can be stripped off.

The horn is expanded by a draw bar with inclined cam surfaces that engage inclined cams on the expanding sections of the horn. The expanding type of horn is limited to size large enough for strength of horn when built sectional.

Can bodymakers are used for square shapes too, but cases arise where tubes are not formed accurately enough by the swinging wings. Tubes may be reformed to accurate dimensions in a die of the type shown in Fig. 13. This die reformed

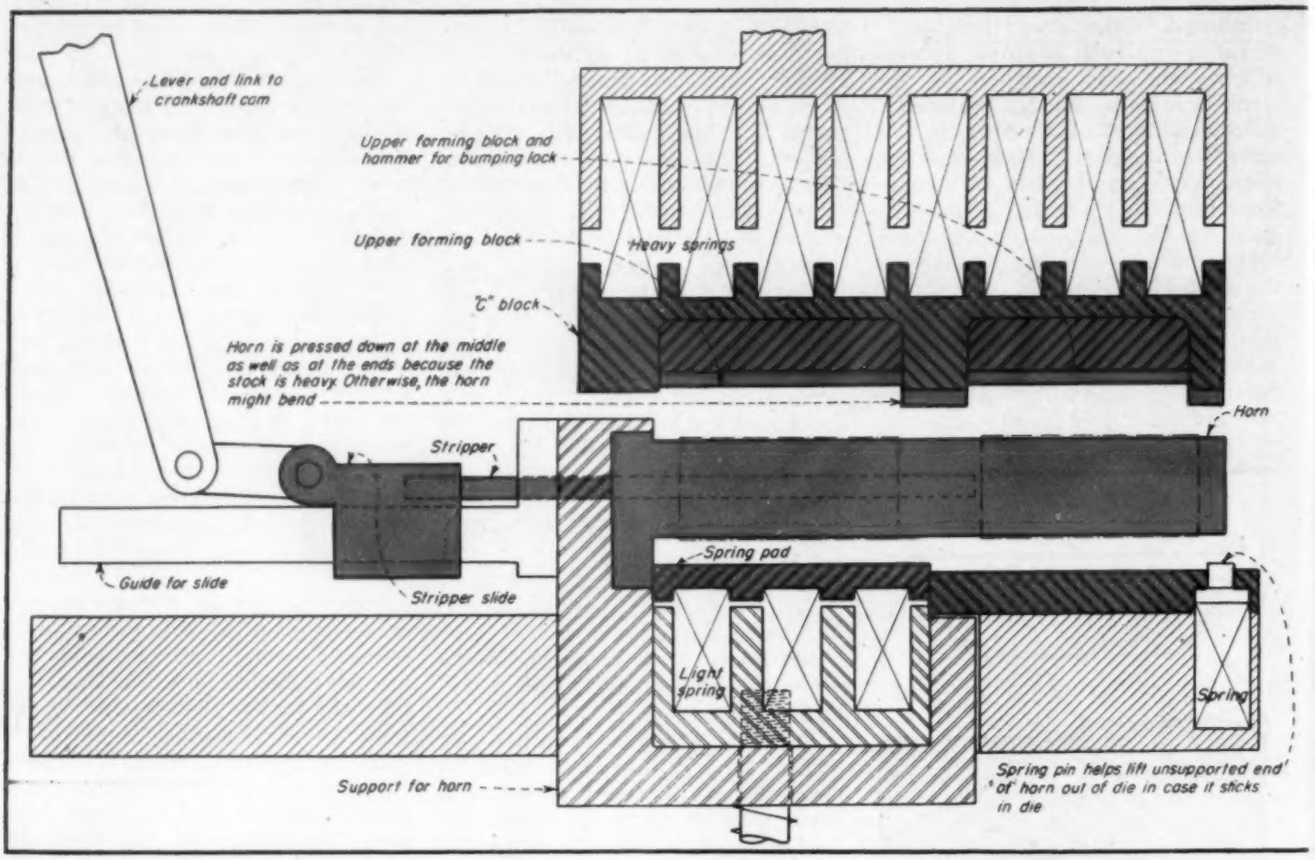

Lever and link to crankshaft cam
Upper forming block and hammer for bumping lock
Upper forming block
Heavy springs
"C" block
Horn is pressed down at the middle as well as at the ends because the stock is heavy. Otherwise, the horn might bend
Horn
Stripper
Spring pad
Guide for slide
Stripper slide
Light spring
Spring
Support for horn
Spring pin helps lift unsupported end of horn out of die in case it sticks in die

FIG. 11— Rifle magazine of 0.020-in. steel is formed from chute-fed preformed blanks in two stations on the horn. In station 1, the tube is formed at the bottom and hooked loosely at the top. The horn has clearance at the top so interlocking edges of blank can be bent toward each other to hook together. The lock is bumped lightly and the tube

a hexagonal bomb tail to accurate dimensions with sharp corners.

The roughly formed tube was slipped onto a horn then expanded by a draw bar actuated by an inclined cam on the punch holder. On the down-stroke of the press, the horn was expanded first and then carried down into the die and bumped by the punch. Punch and die were made slightly convex and the horn was concave so the tube could be bumped hard all around and bent slightly to correct for springback of the metal. The tube was removed by hand.

Many other devices have been invented for forming and locking seamed cylinders. Long tubes are formed with open and lock seams in rolling machines from coil stock or from long blanks. Curtain rods are made in a machine that cuts the blank from a sheet and feeds it through the rolling machine. Short tubes can be made from flat wire in a wire-forming machine.

Long lock-seamed tubes are made in a machine that bends a flat blank U shape over an arbor and forms the lock by carrying the arbor lengthwise under forming blades and rollers that form the lock and roll it tight. Long lock-seamed tubes can be made by hand if the locking edges are prepared on the flat blank in advance. In this case, the blank is wrapped around an arbor by hand and rollers are pulled over the seam. Blanks are prepared with folded edges in dies, brakes or hand folders.

Hand Forming

The old hand methods are used for forming open and lock-seamed tubes in small quantities. Tubes can be rolled to circular shape by running the blanks through three rollers. Two rollers pull the blank and the third roller bends it. The driving rollers, pressed together by springs, separate slightly to roll blanks with folded edges for lock seams.

After rolling, the curved blanks with folded edges are hooked together by hand, and the seams

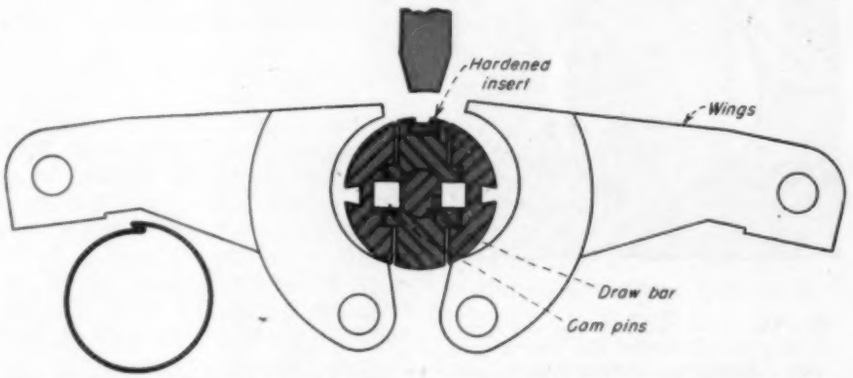
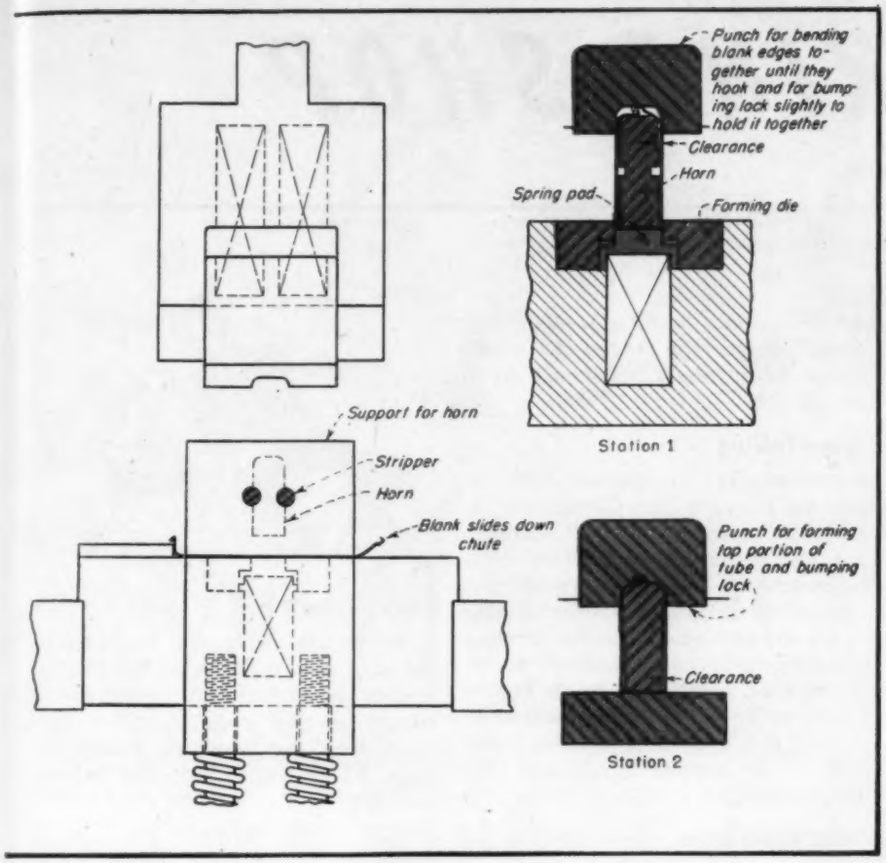


FIG. 12— Can bodymaker forms lock-seamed cylinders in one station. A flat bank with folded edges is bent around a collapsed expanding horn by wings, and edges are hooked. Horn is expanded by cam action, pulling interlocked edges tight, wings open and hammer bumps the lock seam. Expanding-horn forming is limited to tubes of ⅞-in. dia. or larger



fed to station 2 where lock is bumped and tube formed at the top before being pushed off the horn by the next tube fed from the first station

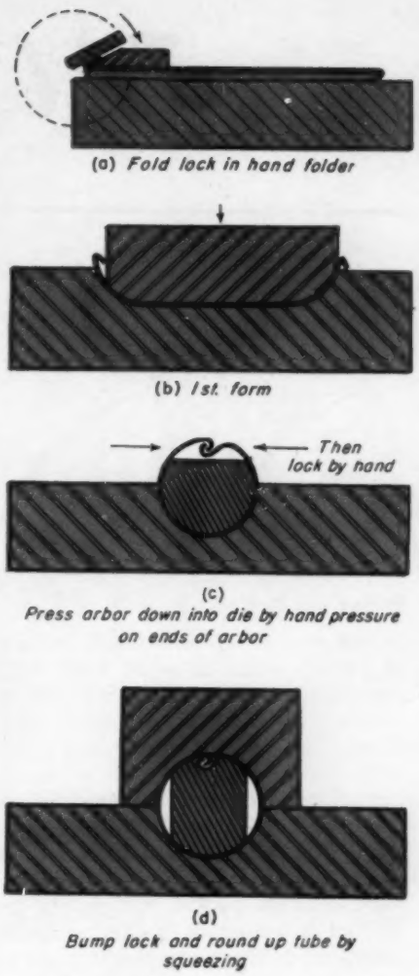

(a) Fold lock in hand folder
(b) 1st. form
Then lock by hand
(c)
Press arbor down into die by hand pressure on ends of arbor
(d)
Bump lock and round up tube by squeezing

FIG. 14— Hand forming of lock-seamed tubes in small quantities is done in 4 stages: folding lock in hand folder, preforming in die, bending around a horn and hooking edges, and finally bumping lock and rounding up by squeezing so metal swells to fill die cavity

bumped over a horn in a horning press. This rolling method is satisfactory for cylinders of large diameter, but smaller cylinders of less than 1½-in. dia. should be curved in dies.

Square lock-seamed tubes can be formed in the manner described in Fig. 14 except that they are made with right-angle bends.

Lock-seamed tubes can be made so cheaply in comparison with seamless drawn cups with their bottoms cut out and with seamless tubing that the cost-saving possibilities are worth investigating.

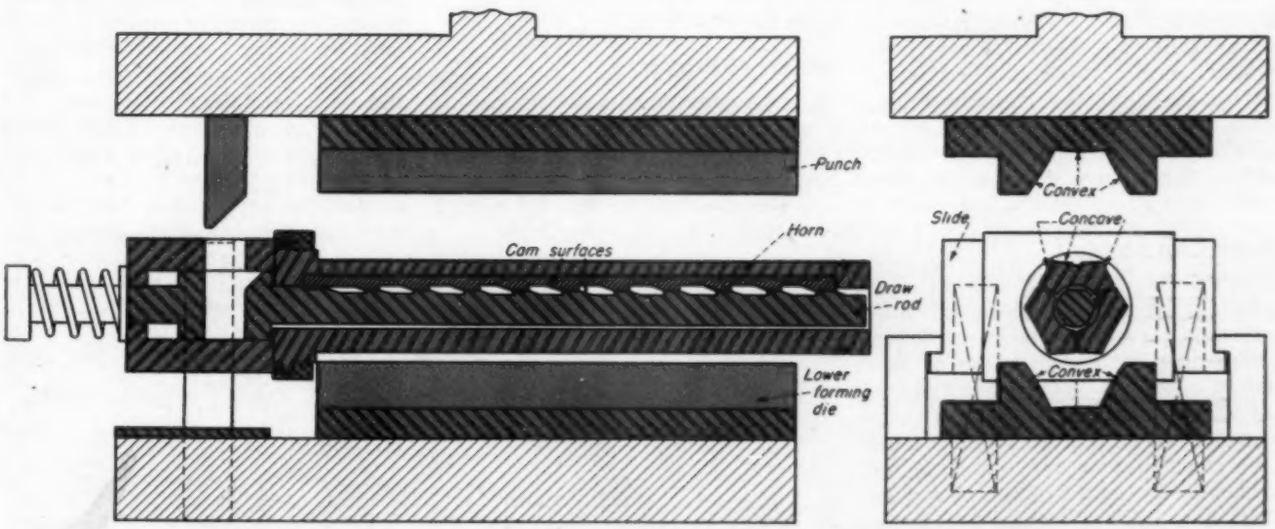


FIG. 13— Die reforming to accurate shape and dimensions of hexagonal tube made on a can bodymaker is accomplished on a cam-actuated expanding horn. Convex surfaces on punch and die and concave surfaces on horn overbend metal to compensate for springback. This die reformed a hexagonal bomb tail.

TALKING SHOP

Practical Badge

IN THE WELTER of convention badges of plastic, metal or what have you, one stands out in our mind like a beacon light. It's practical and simple, cheap and convenient. It's not a badge at all, but a 3⅜ x 7⅜-in. card. The program is summarized on one side, a gummed label with your name and company is stuck to the top of the other. It fits upper left coat, shirt or vest pocket, can easily be shifted to an inside pocket at those times when the shyster is trying to get your name or the storekeeper has that "stick the visitor" look. It is used by the American Gear Manufacturers Association. Write Newbold C. Goin, general manager, 301 Empire Bldg., Pittsburgh 22, if you have badge troubles with your society or show. He'll give you a sample, we're sure.

Beneath the space for the name, incidentally, are several printed paragraphs, the second of which is worth quoting: "Wear it (the badge) at all times in the meeting room. You may think you are famous but you might be surprised at how many others don't know your name. *Can you name every man in the room?*"

Care Can Save

DURING the war, G.M. Aircraft had displays in all divisions of jobs ruined by carelessness or mistakes, placarding each with value of material and labor lost. John Stephan of Cleveland comes up with a present-day suggestion for implementing the same idea—a card carrying the legend: "Up to this point, this piece cost $——. My work can add $——, or waste the whole investment. I must be careful." Public relations men must be careful, too, in applying the idea—but with a concurrent campaign on the value *to each worker* of cutting costs it can do a needed job.

Home Telling

INTERNATIONAL HARVESTER did a bang-up job of telling Chicagoans of its 100th anniversary. "El" stations and signboards plastering the city announced it, invited the public to a huge free exhibit at Soldiers Field, where old and new farm equipment, in model or full size, was set up in its working habitat. Souvenir handbooks were beautifully illustrated, showed the importance of the company in the growth of Chicago and the country.

Gear Esperanto

EXPERTS and shop men, buyer and seller, must use a common language for gearing—or misunderstanding will continue. Local or one-company terminology must be incorporated or banned in specifications. While the specialists by no means agree among themselves, they are approaching agreement in a tentative AGMA standard on nomenclature. The same idea might be applied in a number of other fields in the attempt to corral our amazing slanguage into something understandable in the next town or next state.

Chatter Stopper

TO TAKE CHATTER OUT of threads on a screw-thread miller (where there are several multiple spindles on a large horizontal rotary table), each unit was mounted on springs instead of bolting it to the rotary table.

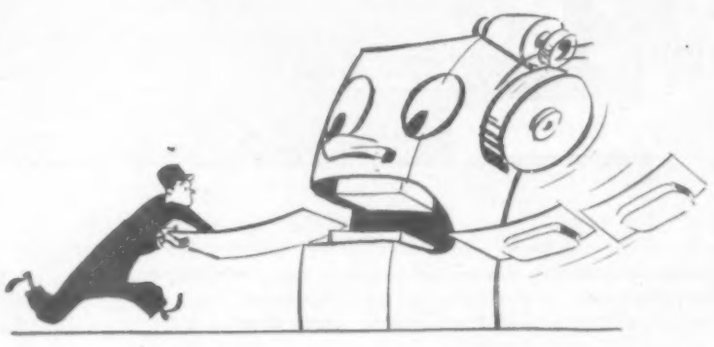
Yarn of the Year

C. E. WILSON of General Motors told this one at a meeting of the Engrg. Society of Detroit. A young G. I. couple wanted a baby and a car. They didn't have enough money for both. Final choice was the baby—less expensive, quicker and surer delivery than on the auto.

To the Egress

BARNUM used to keep crowds moving through his museum by a sign at the end reading, "This Way to the EGRESS." Crowds thought the unfamiliar word meant a strange animal—not the exit.

Production men face a similar problem, for machines have outpaced the handling equipment in many plants. Getting work in and out takes more time and labor than fabricating (A third of the manufacturing costs in one big company is moving materials around). We've been providing a series of articles on efficient materials handling about the shop, plus data on the care and feeding of machines. Press Feeds is a recent special report you'd better study if you have presses. It tells about ejection devices too—Metalworking offspring of the Egress.



The Marshall Program

WHAT WILL THE MARSHALL PROGRAM mean to American business? What industries will be called upon to meet the needs, and how great are they likely to be? Will the program carry with it another dose of inflation? Are new bottlenecks being created, or will old ones gain a new lease on life? Where are material shortages likely to fall most heavily?

These and a hundred other questions are in the minds of many American businessmen today. Unfortunately, no final or precise answer can be given to some of them. And it is in the nature of the problem which the Marshall program tackles – that of getting Western Europe on a steady economic foundation – that no precise answers are going to be possible. We have only to view the bad breaks Europe has collected since V-J Day, including the blizzards and drought of this past year, to see how the economic picture can change on short notice.

Nonetheless, the broad dimensions of a Marshall program are sufficiently clear to permit more than a guess about its impact on American business. Both here and abroad committees have been busy for months shaping up Western Europe's rehabilitation needs. At the same time a mine of information has been pulled together about our own output and capacity. The result is a small library of technical reports which carry most of the facts Congress needs for a decision on the immediate problem.

McGraw-Hill's Department of Economics has waded through these reports and queried industry itself to determine the likely effect of the Marshall program on American business. This report carries the main results of their investigation.

One conclusion emerges clear-cut. American business can not provide the assistance Western Europe will need without considerable cost to itself. Such costs are outweighed by the gains that can be expected, economic and social, as well as political. Nevertheless, business will want to anticipate those difficulties that might arise and move to overcome them. The following pages, therefore, highlight both the problems and the benefits that are likely to fall to American business as a result of the Marshall program.

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The Marshall Program

WHAT IT MEANS TO AMERICAN BUSINESS

WESTERN EUROPE'S INDUSTRIAL MACHINE has picked up considerable speed since V-J Day. But vital gears are not meshing and industry isn't getting the job done that is necessary. The things people most need are those that are lacking. Food output is down more than a fourth. Coal production is lower by a fifth. The net result is a living standard that ranges from bare subsistence in some countries to a level far short of prewar in others. And even this depends on imports for which the area can't pay.

This melancholy economic picture has its political counterpart. The best organized and the most energetic political party in France and Italy is Communist. While the Communists in Germany and Austria are less strong, they still are an element to be reckoned with. These are all key areas which, should they fall within the orbit of an unfriendly power, could well destroy the freedom of political action throughout all of Western Europe.

Needless to say, such a development would have military implications of the utmost importance. It is a military axiom that any defense must be organized in depth. And in the event of any emergency "depth" for the United States must now include Western Europe.

It is this complex mixture of the economic, political, and military, then, that has led to the Marshall program. Underlying this program is a deep conviction: That Western Europe possesses the skills and resources necessary to work out its own economic salvation. The fact that in two years it has not done so reflects both the depth of the wounds it suffered in war and the bad breaks it has received since then. With time these skills and resources can reassert themselves. Meanwhile, food, equipment, and materials from America will shorten the job and enable Western Europe to stay on its feet.

Western Europe's Program

SECRETARY MARSHALL gave the program that bears his name its initial push. But it is Western Europe which quickly seized the initiative. A committee of 16 nations met and surveyed their needs and resources. From this survey grew a broad program designed to achieve a balance between the economies of Western Europe and the rest of the world by 1952. Moreover, the program seeks such a balance while raising the standard of living close to that of pre-war days. Hunger and disorder which force extreme social change might thus be eliminated.

As developed thus far Western Europe's economic program is not a detailed plan of action. It does, however, lay out the terrain that must be covered if its objectives are to be reached. Four fields are staked out for action. One involves an immense effort on the part of the cooperating nations to raise their own capacity and output. A second requires the establishment of internal financial stability in countries like France and Italy that now lack it. A third looks forward to closer economic cooperation between the participating countries on a more permanent basis. Finally, a fourth lays out the extent and nature of the aid which Western Europe will require from the United States and the rest of the Western Hemisphere.

It is this fourth aspect of Western Europe's program that is of primary concern to us here. Nevertheless, the hard core of the Marshall Plan is that aid alone can not solve Europe's problem. And it is no exaggeration to say that the most important features of any program are those which Europe itself must fulfill. In this regard, nothing is more critical than the goals set for an expanded capacity and production.

THE PRODUCTION GOALS

Europe's production goals also have an importance for American business. They suggest lines in which Europe eventually will become independent of the United States, as well as competitive in world markets. Here are some of their highlights:

a) An increase of steel ingot production to 61 million tons, a fifth higher than 1938.
b) Development of oil refining capacity to 2½ times pre-war (largely for refining imported crude).
c) Increase of coal output to 644 million tons (U. S. output in 1947 is around 600 million tons).
d) Rapid advance in the output of electrical products —needed in part to help equip a 25 million kw expansion of generating capacity.
e) A large increase in capacity of other key equipment industries; e.g., mine equipment, petroleum equipment, farm machinery, construction equipment.
f) Restoration of pre-war output of bread grains and cereals; expansion in sugar, potatoes, fats and oils.
g) Restoration of merchant fleets to pre-war size.

These are very ambitious goals. They call for a great advance from the current position, as the chart on the next text page shows. In some aspects (electricity, foodstuffs, perhaps coal, are examples) they appear unlikely to be met, at least by 1952. Such a development would, of course, modify the import list.

THE IMPORT REQUIREMENTS

To do the job that confronts it Western Europe has said it needs more than $20.5 billion of goods and services from this country over a period of four years. In return it would plan to offer us goods and services to the value of $4.7 billion. That leaves a whopping deficit of about $16 billion. The heaviest commodity export ($6 billion) – and the biggest chunk of the deficit – would arise next year. Thereafter, exports would fall off about

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Coal: KEY TO RECOVERY

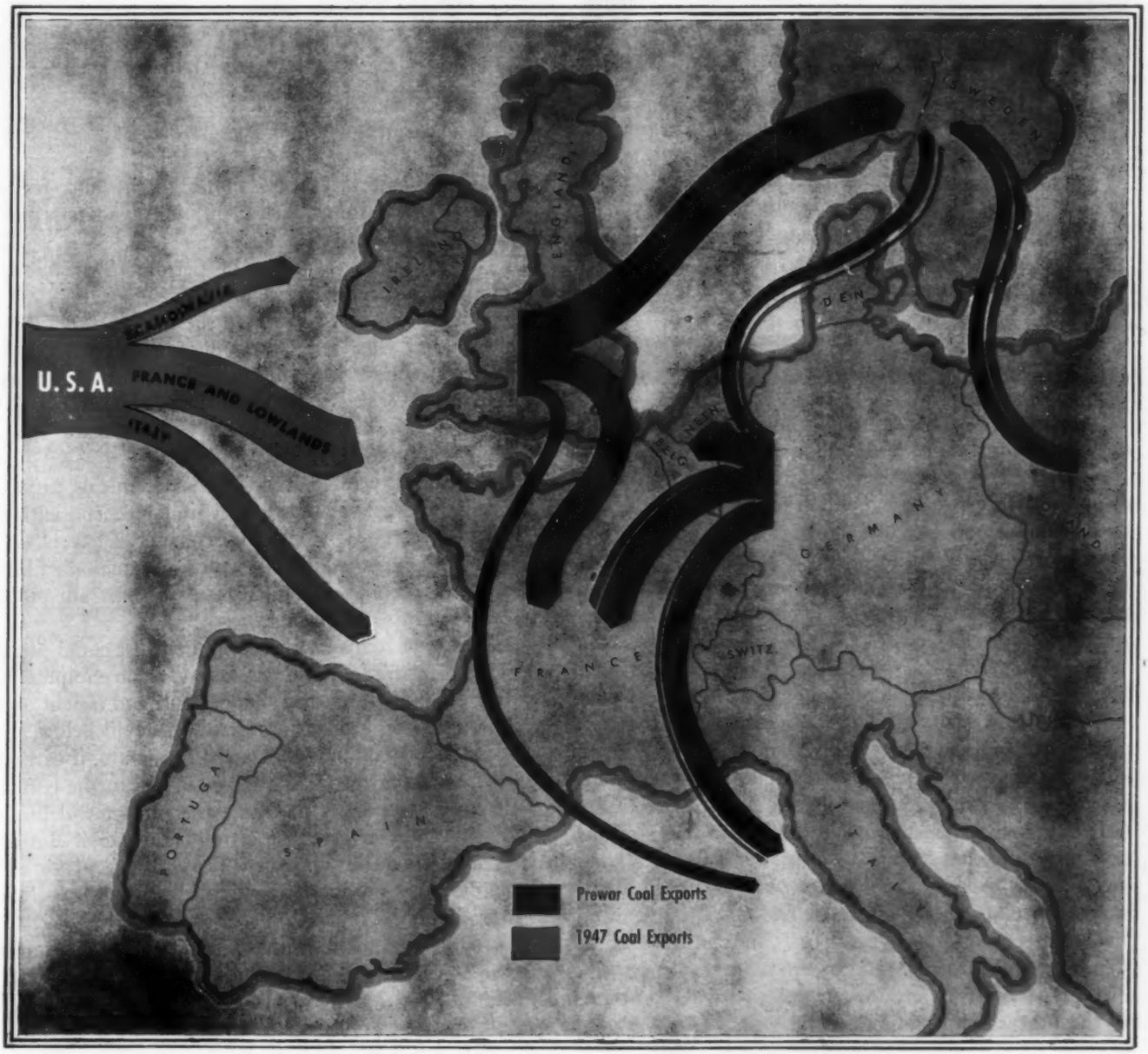
COAL IS AT THE HEART of what is wrong with European industry today. Because of the lack of coal, factories run part time, fields are less fertile, and firesides are cold.

What Western Europe plans to do about coal is typical of what it plans to do about industry generally. The job is to expand output in its own producing centers, resume exports within the region, and cut down costly and unnecessary imports from the United States.

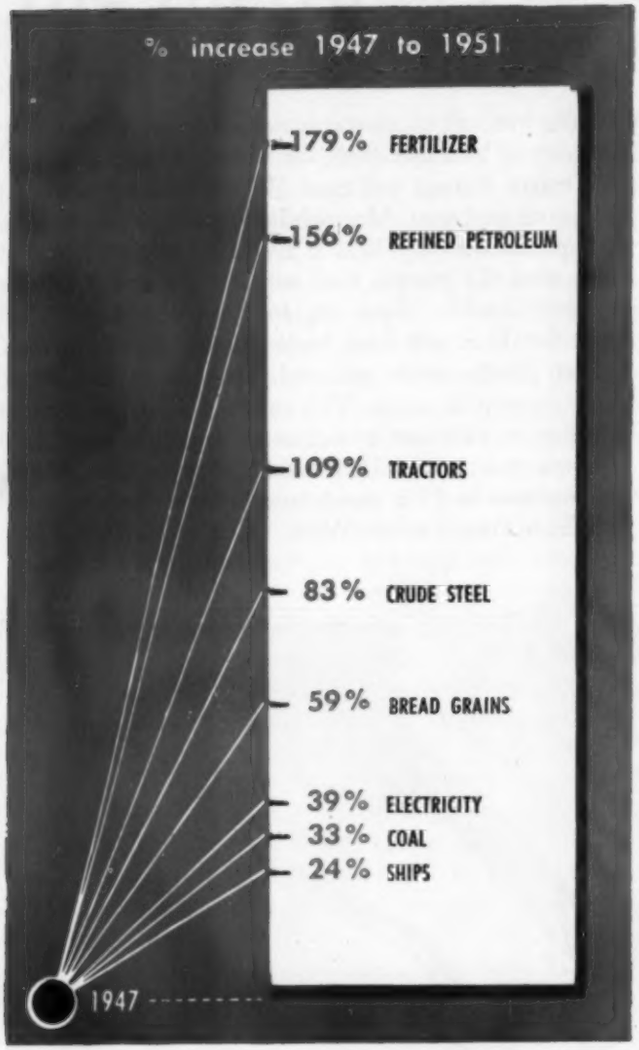
In the case of coal this means restoring a flow which in pre-war days was the life-blood of Europe's industry. As the map shows, two great coal centers – Britain and Germany – supplied not only their own nationals but the needs of other countries as well. Today Britain can't meet its own requirements and coal production in the Ruhr is but half of what it was. The result is the costly necessity to haul coal from the United States.

Western Europe will need 45.2 million short tons of U.S. coal next year. Meanwhile, it plans to build up its own production. By 1951 it hopes to turn out coal at more than the pre-war rate, with Britain and the Ruhr sending sizeable shipments to their neighbors. Coal from the U.S. will have been cut to 6.6 million tons.

Two developments are vital. First, Western Europe must reequip its mines. This calls for a vast production effort on its own part, as well as the import of specialized equipment from the U.S. Second, a river of coal, 34.2 million tons in 1951, must breach the iron curtain and flow from Poland to the West.



Western Europe's Production Goals



one-third to a total of $4.1 billion in 1951.

Nor is the U. S. the only base from which Europe needs vital supplies for which it can't pay. Canada and Latin America are asked to shoulder a trade deficit that comes to almost $6 billions for the four years. Needless to say, if food and raw materials are not available on credit from these areas, the larger will be the sum required from the U. S.

There already is considerable debate about these figures. There will be a lot more while Congress considers the aid program. The fact is, and this is the conclusion at which the President's Committee on Foreign Aid arrived, no final estimate of how much Western Europe's needs might cost over four years can be made. Crops, industrial production, prices, trade relationships and a host of other factors may turn out differently than anyone now expects. For this reason the United States may choose to review Western Europe's progress and its import needs on a yearly basis, rather than fix in detail a four year program. For the same reason our discussion of Western Europe's requirements concentrates largely on the picture in 1948.

As it now stands, the list of items that Europe wants to get from us is more general than specific. Moreover, inter-departmental committees have taken the list and pared it down, chiefly on grounds the supplies are not available. Here is the way the general categories shape up, both as initially requested and as revised. The figures represent total imports and are in millions of dollars.

	European Committee Estimate for 1948	Estimate for 1948 as revised	European Committee Estimate 1948-52
Food, Feed, and Fertilizer....	1,500	1,270	5,400
Cotton	400	350	2,000
Coal	340	370	700
Iron and Steel Products.....	370	230	1,200
Petroleum Products	510	485	2,200
Chemicals	250	200	850
Timber	100	95	400
Farm Machinery	370	100	1,100
Inland Transport Equipment..	200	60	490
Petroleum Equipment	170	130	555
Mining Machinery	80	80	220
Electrical Equipment	150	125	500
Machine Tools and other Machinery	545	450	1,750
Miscellaneous	1,065	1,065	3,030
	6,050	5,010	20,395

A quick glance behind these totals reveals the following:

Among agricultural supplies breadgrains and feedstuffs are the big items. Dairy products and fats and oils are also sizeable.

Of the $2 billion or more of petroleum products, three-fourths are refined and one-fourth is crude.

Coal shipments will bulk large the first year (45 million tons) but they fall off rapidly thereafter.

The steel request originally included 1.5 million tons of scrap in 1948 and more thereafter. This isn't available. Of the finished items, sheet and tin plate come to 744,000 tons in 1948, the peak year.

The chemicals wanted are industrial chemicals, paints, and medicinals as well as a lot of unnamed specialties.

The huge catch-all labeled miscellaneous covers textiles and whatever additional consumer manufactures Europe will seek. Aircraft and surplus ships are other important items in the group.

A number of items on the equipment list could cause considerable trouble. Farm machinery, mine equipment, refining equipment, electrical apparatus, and freight cars are among these. Each is examined in detail below.

These exports under the Marshall program, if carried out, will affect all of U. S. business down to the corner grocery store. In many instances the impact will be so slight and indirect as to be hardly noticeable. But in a few industries the program will loom as a major element, dictating production patterns and setting a limit to capital expansion plans.

It's hard to paint a simple picture of a situation so diverse as this. We try to do so below by dividing the effects of the Marshall program into several broad groups. First we consider the impact of the program on

the general level of business. Next, we cover the impact on leading industries – steel, oil, electrical equipment, farm machinery, and the like – and the effect on business through the creation of shortages in these items. Finally, we examine the influence of the program on farm prices and living costs.

THE OVER-ALL LOOK

The Marshall program comes at a time when certain demands contributing great inflationary pressure on business are beginning to slacken. While it will help hold business at a high level, the program itself is not great enough to maintain a general inflationary pressure. Nevertheless, it will give new strength to shortages that have been troublesome to business. In these latter areas, as well as on the food front, prices will continue firm and may go even higher.

If the program is carried out along lines described above exports to Europe will run about $5 billion. The gain here will offset a decline that has already begun in U. S. exports to other areas. After a careful study of these divergent trends, we conclude the end result is likely to be a total export of goods at a rate of about $15 billion in 1948. However, this rate will only be reached after the program starts rolling. The sale of services – shipping, tourist and the like – will add another $2.5 billion to our foreign account. Moreover, this over-all sum of $17.5 billion probably will run about $9 or $10 billion greater than our imports.

Under the Marshall program, then, our foreign trade in 1948 will be carried toward the peak that prevailed in second-quarter 1947. But the over-all inflationary impact of exports in 1948 is bound to be less than it was in second quarter 1947. Not only is our capacity to produce growing, but certain elements in our domestic demand are almost certain to be less strong next year.

This last fact is important and needs to be spelled out. Indeed, it's impossible to determine the effects of the Marshall program without some idea of what would happen to business without it. The accompanying chart which shows how our gross product has been split up in the past several years serves as the starting point for such an estimate. There it can be seen that the spending of domestic consumers takes the biggest slice of the gross product ($164 billion). However, the share going to business and to government also has been sizeable (about $30 billion each). Alongside each of these the net expenditure of foreigners on our goods seems small. Nevertheless, it has a tremendous importance to a huge number of business firms and industries.

Left by themselves, the spending of consumers and of government would be likely to fall very little if at all next year. But business outlays – spending on plant, equipment, inventories, and residential housing – are another matter. Here the vulnerable items are plant and equipment. Capital expansion has been extraordinarily large for two years, and in not a few cases business is completing its initial post-war program of capacity expansion. Therefore, some decline, but not a large one, is expected in the aggregate of business spending during 1948. This in turn would have some reaction – but again a minor one – on the spending of consumers.

The net effect of such developments should be to place industry in a better position to meet the pressing needs of the Marshall program. This does not mean, however, that the program can be handled without difficulty. The trouble is that many of the items Western Europe most needs are those which would, under normal conditions, continue in tight supply. It is these bottlenecks that business will want to anticipate and, to the extent possible, overcome. Here are the facts concerning the most important of them.

COAL: TRANSPORT IS THE DIFFICULTY

Western Europe wants 45 million tons of coal from the U. S. in 1948. Thereafter requirements drop sharply to 6½ million tons in 1951.

U. S. production of bituminous next year ought to equal the 600 million tons turned out in 1947. If it does we can meet Europe's need. However, the job will call for careful scheduling of delivery. For the real problem in coal is a shortage of coal cars. This has plagued industrial consumers in 1947. Unless car turn-around times are improved (they now average 14 days as against 11 during the war) car shortages will continue through 1948. Under such circumstances, exports to Europe won't permit the accumulation of normal stockpiles – a fact managements in many industries won't like.

Any actual shortage in production that might develop will be limited to special types of coal – particularly the better grades of coking and by-product coal. Europe has concentrated largely on these. Such concentration isn't necessary, but since transport costs (the big element for Europe) are about the same for all grades, Europe has

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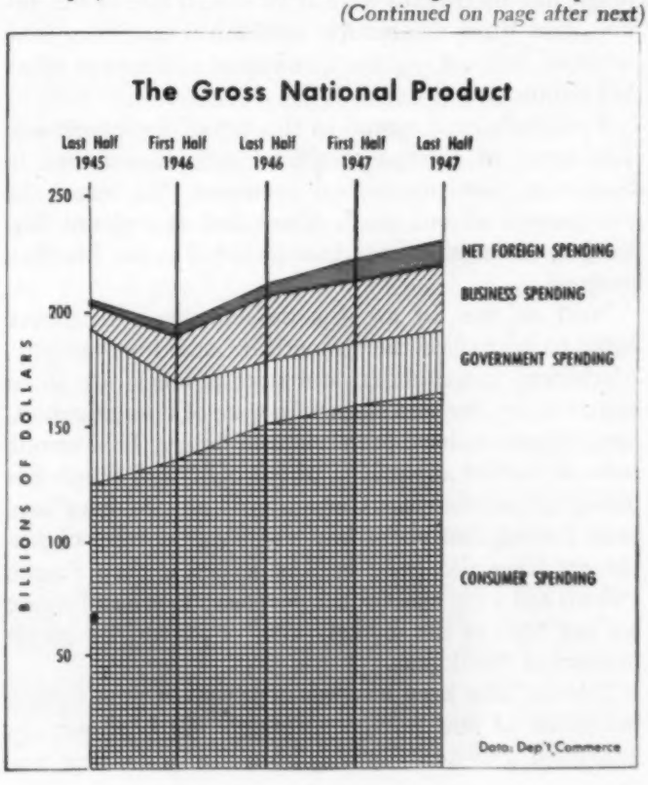
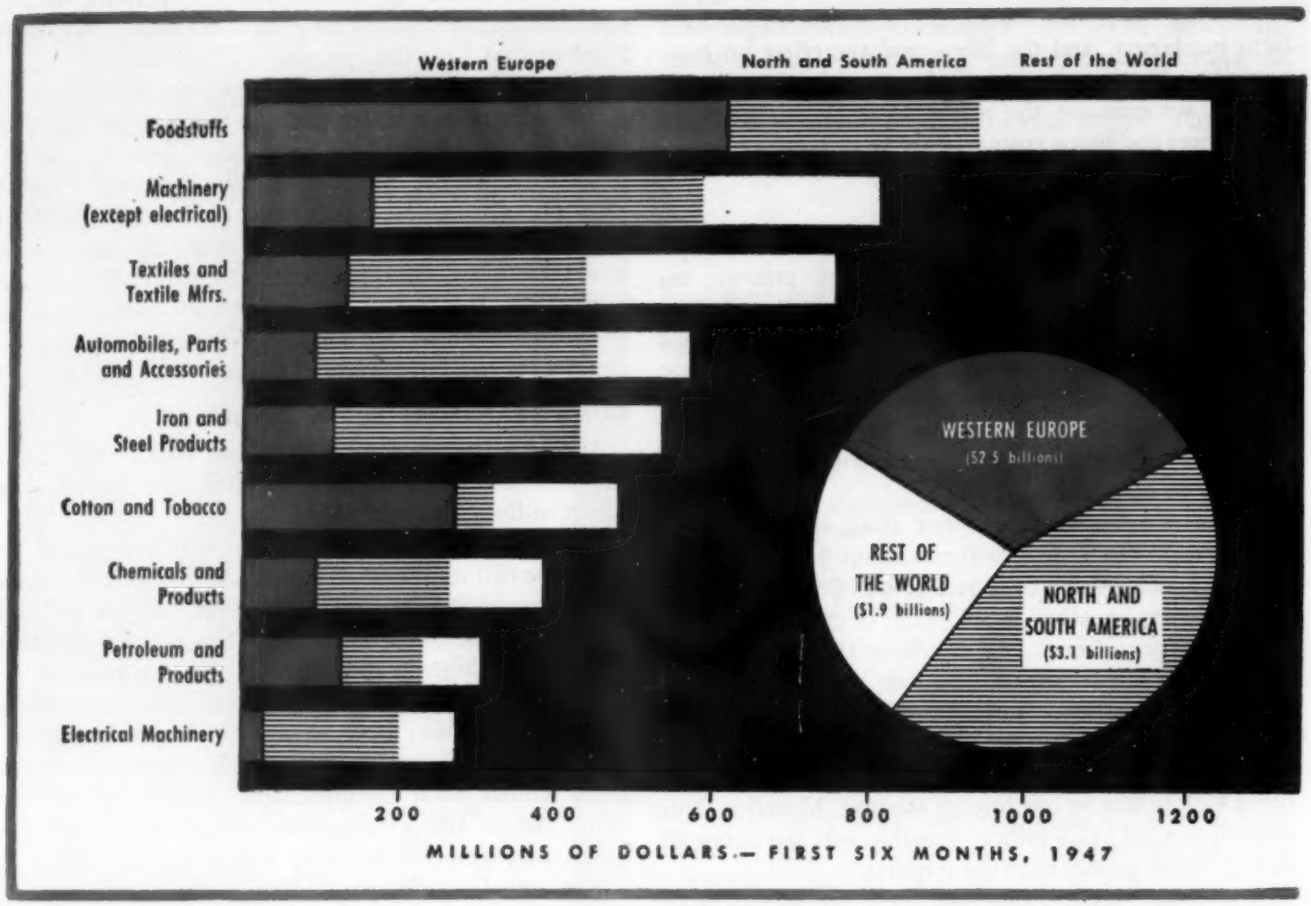




U. S. EXPORTS . . . Where they go — What they are

U. S. EXPORTS THIS YEAR hit an all time high. Shipments in the first six months were at an annual rate of $15 billion, four times the pre-war rate. Since then they have declined, but not greatly. The export rate now is about $13 billion.

Foodstuffs have moved to the top of the export list. The needs of Europe combined with crop failure in Southeast Asia have revived an export that before the war seemed all but dead. About half this record flow has been directed to countries included in the Marshall program.

Next on the list are the durable goods that have come to symbolize the strength of American industry. Machinery, automobiles, and steel products are all in extraordinary demand abroad. In spite of domestic shortages, shipments have been relatively heavy. Thus in one form or another about 18% of our tight steel supply has moved abroad this year. Canada and Latin America have been the big customers, and sizeable quantities of machinery have also gone to Russia. Other than France (which had a big loan for the purpose) Western Europe has not been in the market. They've needed the goods but lacked the dollars.

Textiles have been another huge export group. Here the influx of new foreign customers has been warmly welcomed. For heavy buying from abroad has kept textile output going at a good pace.

Cotton, tobacco, oil, and chemicals are other supplies that bulk large in U.S. trade. Western Europe has been a principal buyer of all except chemicals. Canada and Latin America again have been at the head of the line for these last items.

Regardless of the Marshall Program, some shift in U.S. export trade could be expected in 1948. The recent splurge of foreign buying cannot be maintained if for no other reason than that funds will not be available. U.S. import of goods and services — the chief source of dollars for most of the world — has been only 40% of exports. About $10 billion of loans and relief grants helped keep Europe in the market. At the same time, foreign nations drew down dollar balances and shipped gold.

Net effect of the Marshall program on exports is to provide $4 to $5 billion of trade that otherwise is lacking. Not all this added trade need be with Europe. If the U.S. provides dollars for Western Europe to buy in Latin America and Canada—which it well might—those areas will spend more here. Nevertheless, under the Marshall program much more of our trade will be directed toward Western Europe and the things it wants. These are foodstuffs, industrial supplies, and machinery. Little in the way of textiles or automotive equipment is on Western Europe's shopping list.

sought the best. U. S. utilities, steel and gas manufacturers, and the Great Lakes trade are large domestic users of these fuels. They will continue to feel competitive pressure unless Europe's buying habits are changed.

PETROLEUM — WORLD-WIDE SHORTAGE

Regardless of whether the U. S. provides the full amount of petroleum Western Europe has asked for, industry and households may have to go slower on switching to fuel oil than they desire. Oil already is in tight supply in America, and this reflects a shortage that is world wide. The cause of this shortage lies not only in refining and production bottlenecks. Perhaps even more important is the lack of sufficient transport capacity, particularly pipe-line and tank car. With steel (including pipe and tubes) as it is and will be, this tight oil situation can't take a quick turn for the better.

Europe wants to build up its imports of crude and do a steadily larger amount of processing on its home grounds. Here is the way dollar imports of the two broad groups were initially scheduled by the European Committee at Paris (figures are millions of tons).

	Imports of Crude	Imports of Refined Products
1947	6.1	17.0
1948	8.5	17.7
1949	10.2	19.0
1950	12.6	18.2
1951	18.8	13.7

These requirements are not likely to be met in full during 1948. However, we should at least match and perhaps slightly better the export of 1947. In 1949 the situation should be somewhat easier. But no one will be surprised if refinery construction in Europe lags and more refined products are needed than plans call for.

The European Committee was careful to say these imports were from "dollar areas." That means they are supplied by American companies (who need payment in dollars), but not necessarily from the United States. As a matter of fact, almost 60% of Europe's oil in 1946 came from the Caribbean and the Middle East, as against 20% from the U. S. proper. American companies furnish much of this foreign oil and any increase in exports probably will flow from foreign supplies.

All this is not to say that the export of oil from the U. S. proper is not considerable. It is, with exports this year running at a rate of more than $600 million. About $250 million of this—chiefly refined products—has gone to Europe. From the standpoint of refining capacity alone, shipments of refined products from the U. S. could, in a pinch, be stepped up slightly. But capacity also should be available in the Caribbean and the Middle East. It makes economic sense to ship from these other areas and they should get the business.

CHEMICALS AND FERTILIZER

Nitrogen fertilizer is the one U. S. chemical product high on Western Europe's priority list. Industrial chemicals and pharmaceuticals are wanted, but are not likely to be purchased in quantity if funds run low.

Nitrogen, of course, is in extremely short supply the world over. Moreover, this shortage probably will not be licked until the early Fifties. If Western Europe were to receive the full 319,700 tons of nitrogen it desires from the Western Hemisphere in 1948, consumption in the U. S. would of necessity be reduced. Not only would commercial exports have to be increased, U. S. imports would also decline. Large supplies (180,000 tons) from Canada and Latin America make the U. S. a net importer on commercial account.

The likelihood is that Western Europe will get more nitrogen next year than this. However, the advance will come out of a small expansion of production, leaving U. S. consumption what it was. From the U. S. some 70,000 tons (6½% of production) may be shipped. This would equal commercial exports to all areas in 1947.

The U. S. also will provide phosphates to Western Europe – perhaps 80 to 85,000 tons. However, production should be adequate to carry this with little trouble.

Among other chemical products, Western Europe would like the following (figures are millions of dollars).

	1948	1948-51
Industrial Chemicals	50	190
Paints and Pigments	40	145
Coal Tar products, Medicinals, etc.	160	515
	250	850

No forecast of our actual export of these products is possible. However, shipments are likely to run considerably lower than the above figures suggest. Western European production can fill the most essential needs. Since supplies here are very tight on many items, exports to Europe may not greatly exceed those of 1947.

STEEL — STILL THE NO. 1 PROBLEM

No material caused more trouble for U. S. industry in 1947 than steel. The extent of the shortage in 1948 – and the possibility that it might end – has been a key element in the plans of many producers for next year. Under such circumstances the needs of Western Europe are bound to be weighed and measured with care.

Here is what the initial report from Paris asked for in the way of steel (figures in thousands of tons).

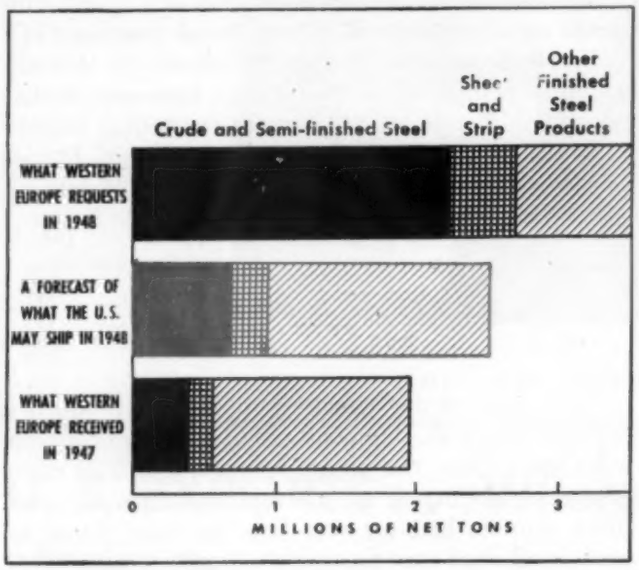
	1948	1949	1950	1951	Total
Ingots and semi-finished items	2,244	2,299	2,475	2,387	9,405
Sheet and strip	424	198	34	...	656
Tin plate	320	314	296	275	1,205
Other finished steel	500	...	...	...	500
TOTAL	3,488	2,811	2,805	2,662	11,766
Steel scrap	1,500	2,000	2,300	2,500	8,300

At first glance these requirements don't appear too hard to meet. This year we have been sending steel abroad at the rate of 6.2 million tons annually. Canada and Latin America took more than 3.5 million tons of this. Europe took only about 2 million tons. Apparently the problem could be solved by shifting exports.

Unfortunately, the answer is not as simple as this. What Western Europe wants – it's really Britain and Italy that want it – are steel ingots and other semi-finished items (billets, blooms, etc.). These the U. S. has been consuming itself. Exports have been almost entirely in the form of finished products.

From the standpoint of the steel industry, shipment of semi-finished items has two bad results. Certain finishing capacity would be made idle. As a matter of fact, the amount of semi-finished steel Western Europe wants is 40% of the supply non-integrated producers of steel products have been able to get from the integrated producers (who turn out the ingots). In addition, badly needed scrap from the finishing process would be lost.

The Dilemma in Steel



What we shall do about this hadn't been settled yet. Those of the President's Advisory Committee on Foreign Aid who specifically studied the question felt very little semi-finished steel should go abroad. This, however, would hit Western Europe hard. A likely compromise – and one suggested by the Government agencies reviewing Western Europe's requirements – would substitute finished items for semi-finished. Shipments of the latter in 1948 would be held to around 650,000 tons, less than a third of the initial request. But export of finished steel (other than sheets or tin plate) would jump to 1,150,000 tons. On one matter, however, all seem agreed. No straight scrap can be sent. The U. S. just doesn't have it.

Where does the steel consumer stand on all this? From his point of view the export of any steel makes life more difficult. No matter what is shipped he will feel it next year. Here is the probable situation under either the initial request or as it may be revised.

a) Overall the supply will remain about as tight as it has been this year. Although demand on the part of equipment producers is expected to decline somewhat, this will be offset by heavier requirements for construction, transport, and export. Late in 1948 and early in 1949, addition of 2.5 million tons of basic ingot capacity may help somewhat.

b) Steel sheets will continue to be a headache, but probably slightly less of a one than in 1947. Long awaited additions to capacity are beginning to come in. By the end of 1948 the total should stand 3 million tons higher than at mid-1947 (a gain of about 18%). Western Europe probably won't get all it has asked for. Shipments might not exceed 225,000 tons, half the initial request. And most of the increase over the export this year (164,000 tons) is likely to come out of shipments that have been going to other areas.

c) Tin plate also seems destined to remain tight. But here the trouble is as much tin as steel. Exports this year are 561,000 tons, but only a fourth has been shipped to Western Europe. If Europe's requirement of 320,000 tons is to be met, other world areas will probably bear much of the burden.

EQUIPMENT BOTTLENECKS – COAL EQUIPMENT

The equipment items are the toughest part of the Marshall program to assess accurately. The European Committee itself failed to develop any clear-cut list of what will be needed. The large sum labeled "mine equipment," for example, includes a certain amount of electrical apparatus. And no detailed breakdown whatsoever was initially presented for the broad equipment groups listed earlier. Some of these shortcomings will be rectified by information now being obtained. In the meantime, equipments lines where the added needs of Western Europe undoubtedly will cause difficulty can be earmarked.

Coal equipment is one such item. The total of $80 million which Western Europe wants in 1948 is half again as much as our export to the entire world this year. Today order backlogs run from 6 to 24 months on many types of mine equipment. Fortunately, some that are most tight – mine locomotives, coal loaders, coal cutters (except the long wall type) – apparently are not wanted by Western Europe in quantity.

Equipment that is needed quickly includes pneumatic tools, conveyor belting, and long wall cutters. These are all adaptable to European mining and can relieve bottlenecks that now exist in supply. Conveyor belting is the most difficult of these items. However, the main trouble in meeting Western Europe's coal equipment needs may arise from another direction – the supply of machinery, parts, and materials for producers of mine equipment in Britain and on the continent. Without help, European plants can't meet the production schedules set for them.

PETROLEUM EQUIPMENT

Western Europe may spend about $130 million on U. S. petroleum equipment next year. This is three-fourths of what was originally planned, but it comes close to our total export of petroleum equipment in 1947. The entire expansion program projected by Western Europe's oil industry will run to some $1.8 billion in four years, with a third for U. S. equipment.

Big items needed probably will include steel pipe and tubes, pumps of many sizes, large vessels (fractionating towers), turbo-generators, and well drilling apparatus and parts. Probably the most difficult problem here is steel tubing. Orders are now on the books for production into 1951. Very little has been exported, and what Europe gets in 1948 will clearly be at the expense of domestic consumers. Other trouble spots are pumps, turbo-generators and large vessels.

Our own petroleum industry is undertaking a record capital outlay on production and refining of about $3 billion this year and next. Part of this is in the Middle East and Western Europe itself. Therefore Western Europe's oil industry will compete with American companies for scarce equipment and supplies. Such competition is to be expected in Europe, as well as here.

Since the American program is much further advanced, Western Europe's expansion plans may well lag. This certainly is likely to be the case in the Middle East. Almost half the U. S. equipment wanted by British and French companies is for projects in that area. Many of these require the help of American engineering firms, since U. S. engineers are most familiar with recent developments in installation and design. This engineering talent is itself a scarce element in the petroleum expansion scheme. It may prove the factor that sets a slower pace than Western Europe had planned.

FREIGHT CARS — DELIVERIES LAG

Freight cars for Germany are the only import of inland transport equipment which Western Europe urgently needs from the U. S. Production within the area can take care of most other requirements.

Import requirements initially were set by the European Committee at 103,000 cars, with 89,000 needed in 1948-49. European equipment is less than half the size of ours; so in terms of U. S. freight cars this boiled down to about 20,000 cars in 1948 and 19,000 in 1949.

Freight cars, of course, are one product whose need in the United States is urgent. Car builders have more than 100,000 cars now on order. Thus far their deliveries have failed to average more than 6,000 cars a month.

The President's Committee on Foreign Aid, surveying the tough situation here and in Germany, finally recommended a shipment in 1948 of 20,000 cars (the American equivalent is 8,000). To the extent this is met, American railroads will have to accept somewhat later delivery. The number involved is not great enough, however, to make any appreciable difference in the overall freight situation. This is likely to remain about as tight in 1948 as it has been this year.

ELECTRICAL EQUIPMENT

Equipment for Europe's electrical industry may prove less troublesome than originally expected. Western Europe plans to produce all the heavy apparatus required for its vast generating plant expansion — at least for the first several years. Thereafter, U. S. producers will be in a position to help them if they need it.

The four year need for U. S. equipment originally was set at $500 million. Some $300 million of this is to be spent on items that do not include any heavy apparatus. Materials and equipment required by the electrical manufacturers themselves are on this list, although no details are given. Its exact effect on our own electrical industry can not be measured until we know more specifically what is involved.

The remaining $200 million will go for hydro equipment on projects of an international character. These may possibly be financed by the World Bank and an immediate start on the equipment is probably not necessary. U. S. electrical equipment producers certainly could not get such work well under way for several years. But certain shipbuilding firms might begin on turbine equipment if desired.

If the electric equipment story ended at this point, it wouldn't be so bad. However, the above figures don't give the full picture. Large motors, turbo generators, and other items are also required for expansion in the petroleum, coal, and steel industries. In many cases these very products have held up the completion of new capacity in this country. Even without Europe's demand they would continue tight well into 1949.

MACHINE TOOLS AND OTHER MACHINERY

Western Europe hasn't set any fixed estimate of what it might spend on machine tools, construction machinery, and other equipment. If the entire program went as initially planned, about $550 million would be available in 1948 for such products. However, the amount actually spent will probably be considerably less than this. No direct aid is likely to be given by the U. S. for the purchase of such equipment; so the countries concerned will have to use whatever funds they can scratch up themselves. How much this will be no one knows.

Machine tools are certain to bulk large on this list. Shipments to Western Europe in first-half 1947 were at an annual rate of $75 million. They should be in larger volume next year. Western Europe appears to hold a fairly adequate stock of general purpose tools. But the expansion of capacity in a number of metal working lines, if carried through, will require a large variety of special purpose tools.

Machine tool needs can be met without difficulty. However, one group of products that might cause trouble is construction equipment. This has been in great demand here. While some items are approaching an easier supply position, others like cranes and power shovels remain very tight. Western Europe has spent a modest sum on U. S. construction equipment — $16 million in the first six months of 1947 — but it would like to spend more. If it tries to do so, exports to Canada and Latin America may have to be cut.

Demand for U. S. textile machinery by Western Europe also has been relatively small — about $7 million in first-half 1947. This situation is expected to continue.

with the region producing most of what it needs itself.

Steam engines, canning machinery, milling machinery, and a long list of other equipment items round out Western Europe's capital requirements. Most of these can be supplied without many of the difficulties reviewed above. And there is one product of great importance to America which Western Europe plans to satisfy largely from its own plants – automotive equipment, particularly passenger cars.

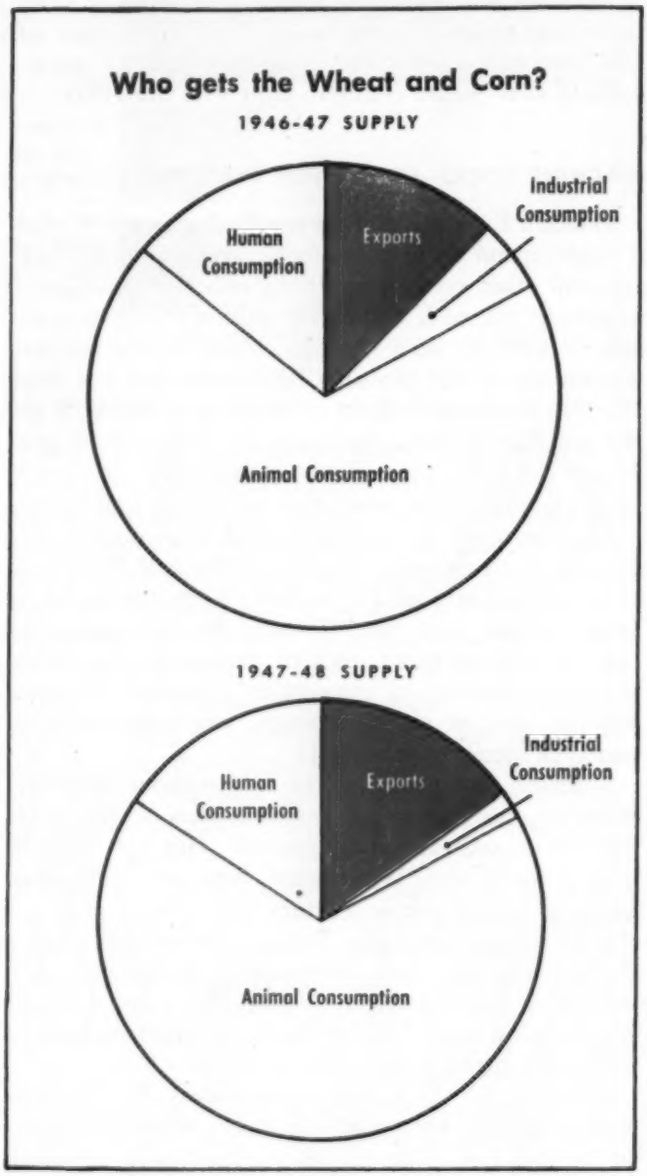
EQUIPMENT FOR THE FARMER

Western Europe's first request for farm equipment in the 1948-51 period was equal to our entire output of 1947. Since this amount obviously can not be spared, the request has been scaled down very substantially. In 1948 shipments are not likely to be more than $100 million, with the new four year goal something on the order of $600 million (half the initial figure).

American farmers can spare this amount of equipment in 1948, although they certainly would buy it themselves if it were not set aside for Europe. Production is likely to run to about $1.35 billion, up some 10% from 1947. But other foreign customers also will have a bid in for a part of this. Canada and Latin America, who bought some $105 million of the $175 million of farm machinery exported this year, need further equipment badly and cannot be shut off with nothing.

After meeting the European and other export demands, American farmers still should receive more new equipment than in any other year except 1947. Thus, they will continue to make considerable progress in their drive to mechanize, although the pace will be slower than they would choose. Above all, the demands of Western Europe and other countries should not be too large to interfere with U. S. food production.

Who gets the Wheat and Corn?



THE FOOD SITUATION

Food may turn out to be one of the chief trouble spots of the Marshall program—particularly for American business. Because of the program, food exports will be larger, domestic consumption somewhat smaller, and prices higher than they otherwise would be. In spite of this, Americans should eat about as well next year as in 1947. However, if prices are bid up in the process, wages and industrial costs may climb with them.

As matters now stand Western Europe would plan to spend about $1 billion on U. S. food in 1948. This is less than they spent in 1947. It also is less than Western Europe feels is necessary to realize the minimum standard of living it set up as a goal for 1948. However, the overall supply of grains – by far the largest commodity on the food list – is down this year by 14%. As a result estimates of Europe's food imports have been reduced.

Here is what went into the record export in the fiscal year 1946-1947. (Figures are thousands of long tons).

	Shipments to Europe 1946-7	Total Exports 1946-7
Wheat and Flour (grain equivalent)	6,638	10,520
Other grains	2,572	4,538
Fats and Oils	156	233
Meat (carcass weight equivalent)	195	224
Dairy Products	322	493
Other Foods	1,266	2,425
Total Foods	11,149	18,433

The President's Committee on Foreign Aid has recommended Europe receive about the same total foodstuffs as last year. However, the product mix will have to be changed. Moreover, the rest of the world will get about a million tons less. Wheat will substitute for corn, but even then the total supply of grains available to Europe will be down 700,000 tons or more. Half of this may be made up with a heavier shipment of fats and oils, including peanuts. Dried milk solids, dried fruits and other products will close the rest of the gap.

There is no doubt the U. S. can send abroad whatever foodstuffs Congress finally agrees upon. The big question is whether this can be done without forcing prices higher. Wheat shipments, for example, may run 40% greater than would normally be exported under current circumstances.

Unfortunately no final answer on food prices is possible. On the supply side much will depend on how next years crops turn out. So far crops are off to a bad start, with winter wheat probably below that of a year ago. As for domestic demand, consumers are likely to have at least as much purchasing power next year as this. The problem is to persuade them to use it on commodities that embody less grain.

When all these considerations are added together it is apparent that food prices over-all do not stand much of a chance to fall markedly in 1948. On the contrary, there is more than a small chance they will rise. Moreover, under the Marshall program exports in 1949-50 would still help support farm and food prices. Any substantial decline could be initiated only by a fall in domestic consumption. Needless to say, these are matters that are important to the business community.

Long Range Problems

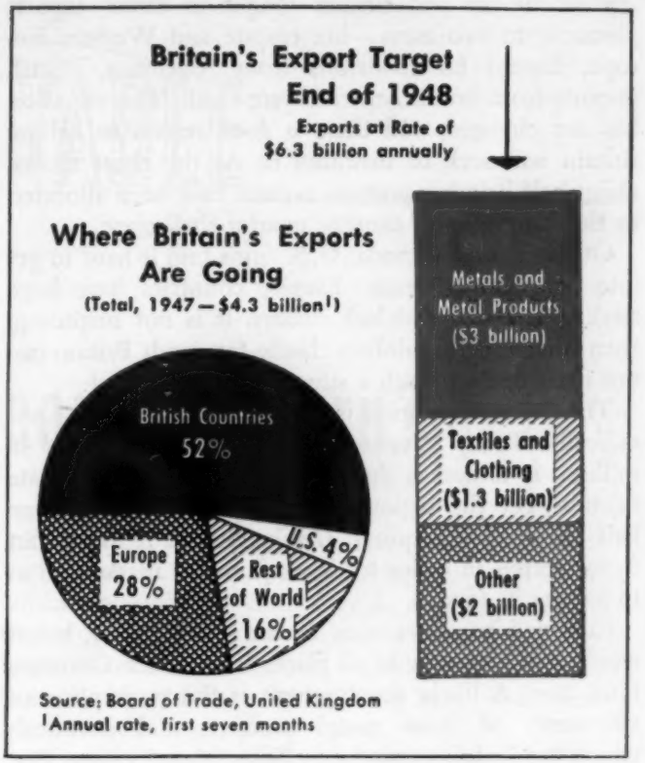
A PROGRAM of the size Western Europe has set for itself inevitably will influence American business over the longer run. New industries are to rise, old ones are to be rebuilt and expanded, exports are to be pushed — all this has a direct bearing on America's foreign markets of tomorrow. Any sound and final judgment concerning the Marshall program, therefore, must weigh certain long run considerations as well as the short.

These longer range considerations are summed up most simply in an assessment of the broad pattern of Europe's future trade. Here a few key trends serve as useful signposts. They are:

a) Industrially Western Europe is preparing to make itself more independent than before the war. This will reduce its imports from the United States. After 1951 export of American manufactures to Europe will be concentrated largely in specialized items which this country has a superior knowledge and skill to produce.

b) Prior to the war Western Europe was primarily an exporter of textiles, industrial products and high quality consumer goods. Industrial revival is along the lines that will push these same products. However, Western Europe's program for expanding industrial capacity points to one significant modification. Capital goods exports — electrical equipment, industrial machinery, finished steel — will bulk much larger than at pre-war.

c) Western Europe's world trade must be considerably larger than in the late thirties. Two developments account for this. First the split in Germany and Europe makes necessary a much larger import of essential foodstuffs and materials from outside the Continent. Second, Europe now must pay for a larger share of its imports with exchange derived from exports. In the Thirties, about one-sixth of Europe's imports represented a return on investments held abroad. While this margin is not eliminated, it has been cut substantially.



d) By far the largest items on Western Europe's import list will be foodstuffs and raw materials. These needs to some extent must govern the location and character of the markets to which it exports. The U. S. must continue to be one such market, for Europe will need our wheat.

A survey of Western Europe's import needs in 1951 shows that Britain and Western Germany are the two countries to whom world trade will be of decisive importance. Other countries will trade as they always have. However, their ability to feed themselves to a large extent lessens their trade burden and makes possible the concentration of much of it within Western Europe itself. It is Britain and Germany, therefore, that are likely to become America's heaviest competitors.

Britain has the world's greatest food deficit. Moreover, its factories are largely engaged in converting the raw materials of other countries into finished goods. Britain therefore must export or die, and that is more true today than ever. The British now have set an export goal that would boost shipments to 175% of their pre-war volume. Later they may pare this. Nevertheless, an export volume at least half again that of pre-war will be necessary for Britain to restore its living standard.

Some clues to what and where Britain will export are available in its current trade pattern (see chart). A close study of this pattern leads to one broad conclusion. The British are concentrating on the export of the same general lines which the U.S. will push. Machinery, automobiles, iron and steel products, electrical goods — these are items that even today stand high on the export lists of both Britain and the United States. Britain in particular must turn to durable goods of this character to replace smaller coal and textile exports.

Prior to the war Britain sought to direct exports primarily to two areas – her empire and Western Europe. Except for foodstuffs from Argentina, British imports from South America were small. This situation has not changed, and there is good reason to believe Britain will seek to maintain it. As the chart shows, about half Britain's postwar exports have been allocated to the Empire, and another quarter to Europe.

Other than in Canada, U. S. firms find it hard to get into this Empire trade. Empire countries have large sterling balances and lack dollars. It is not surprising, then, that they use dollars chiefly for goods Britain can not itself deliver. Such a situation may well last.

The German position is somewhat different, but not radically. Today Western Germany's population of 48 million is almost a fourth greater than in the late thirties. Yet the region can produce little more than half the food it requires. Unlike Britain it must start from scratch in order to develop export markets so as to pay for its food.

Coal will be one money maker for Germany, but it won't earn exchange in all places from which Germany must buy. A likely development is the resumption of shipments of those metal products and chemicals which the Ruhr can produce efficiently and in quantity. Iron and steel products, machinery, chemicals and possibly electrical equipment might be expected to flow from German plants for sale on other continents.

South America, with its food and raw materials, is a natural target for German trade. Such an exchange grew rapidly in the twenties, only to fall victim to the great depression. By the late thirties it was again on the road to revival. The third great push for German-Latin American trade is expected in the fifties.

THE FAR EAST

With Britain enlarging its trade to the Empire and Germany coming into other markets, U. S. traders certainly will feel a competitive pressure that is not present today. How tight that pressure is may hinge on developments in yet another region – the Far East.

The Far East is a vast agricultural and raw material area that has hardly moved to the threshold of industrialization. Yet it has great centers that lend themselves to industrial growth. If political stability were to be established in the Far East, the way would open to a trade greatly benefitting both Europe and the United States, as well as the Far East itself. A surplus of rubber, tin, cotton, wood fibers, and even foodstuffs might then be produced and exchanged for the industrial products of the West.

The Far East, then, is one of the big unknowns in the foreign trade equation of the next decade. Another unknown is the reestablishment of trade between the East and West of Europe. Western Europe's plans count on such trade, and it makes good economic sense. But no one can say for sure that economic sense will prevail in this instance.

These unknowns make any final judgment about the long range success of the Marshall program impossible. This much is certain, however. Without the restoration of East-West trade in Europe, a large expansion of Far East trade becomes an absolute essential. In the absence of both, Western Europe cannot possibly achieve stability by 1952.

Pros and Cons

ANY BALANCE SHEET set up by the business man on the Marshall program will carry a number of items on the liability side. Some of the main entries are these:

The program will be costly – perhaps as much as $15 billion. Through their tax bills business men will bear a good share themselves.

At least for 1948 a number of troublesome bottlenecks will be sustained and even magnified. As a result some producers won't realize the expansion they plan.

The high cost of living, the peg on which many labor troubles hang, will move down very little, if at all, and it may move up.

In helping Europe to reequip itself, American industry is arming a potential competitor. Moreover, the arms it offers are of the most up-to-date variety.

There is no guarantee the program will succeed; as a matter of fact certain conditions essential to its success make it look like a risky bet indeed.

Obviously none of these shortcomings can be taken lightly. Against them, however, can be placed some very weighty items on the asset side.

First, and very important, is the simple but humane consideration that without U. S. aid people in a number of Western European countries will be placed in dire straits. At best they will lack adequate food for a healthy life. At worst they will starve.

The economic situation in Western Europe has a profound political and military meaning for the U. S. This is a matter of direct interest to the businessman. If Western Europe ever loses its political independence to another foreign power, the ultimate cost to America will make the expense of the Marshall Plan look like a mere pittance.

Finally, the Marshall program offers the only hope of realizing some measure of economic stability in a world that today appears permanently upset. In this regard the program can do no harm, but only good. Even if it falls short of its stated objectives, Western Europe will have taken a long stride forward.

The assets outbalance the liabilities.

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ROUND TABLE

Learn or Earn?

As Al approached, Ed was so low in spirits that he could have studied the transmission on an ant. "What's the matter, Ed? Don't tell me you're getting down with the flu?"

"No, not that, Al," he replied. "I could get over that easy enough—it's the loss of young Williams that gets me down."

"What happened to the kid? Isn't he one of your best apprentices?"

"That's just what he was," frowned the discouraged foreman. "Williams was one of the best youngsters I ever had in the shop."

"Well come on; let me know what the deal is," puzzled Al. "Don't tell me the young man has joined the Army!"

"No, it's not that—it's worse."

"Worse, how come?"

"Well, Al, it's like this: The kid put the bee on me for more money. When I offered him what I considered a good increase, he just smiled and said he guessed he'd quit anyhow."

"Was the kid feeling all right?"

"Oh, he was feeling right enough, and I don't know what to think of the situation."

"What situation are you talking about?" Al frowned. "Could it be that some girl's old man got after him with a shotgun?"

"No, Al, nothing like that. The truth of the matter is that Williams found out he could get on at Offset Screwdriver Company as an operator and make considerably more than he could possibly make here. I tried to point out to him the advantages he would have in the long run by staying on and finishing up his trade."

"It doesn't take a Sherlock Holmes to figure out what's at the bottom of it, Ed, from what I can figure out. The kid wants to get married, I'll bet my Sunday shirt, and it's the do-re-mi that's stopping him."

"Well, in spite of your brilliant deductions, Al, the kid has moved on. Now, what can we do to hold the other youngsters?"

"That's entirely their funeral, as I see it."

"Oh, no, it isn't; it's ours, too. We'll have to use another kind of bait to land our fish."

"Who could unless he was half pickled?" replied Al. "Do you mean to infer that we have to coax a young man to stay on to learn a trade?"

"If you have any suggestion to make as to how he is to be held I'd certainly like to hear it. Now Williams' value to the firm was no small thing, yet I couldn't compete with the Offset people in the way of wages—it would wreck our whole wage setup."

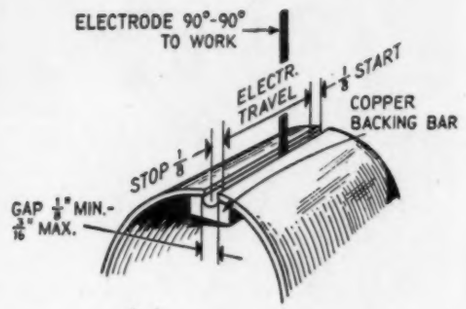
"What's your idea, Ed? If you can't hold a man with a reasonable increase, what's going to hold him?"

"It's got me stumped, Al; I'll just have to leave it up to the readers to straighten us out on this one—you know, there are some darn good ideas lying dormant among the shop men if they could only be pried loose."

***YOUR OPINION** will help Ed solve his dilemma. What can be done to make apprenticeship attractive when money calls—or must it be left to the apprentice's moral fiber? Discussions of earlier problems appear on later pages.*

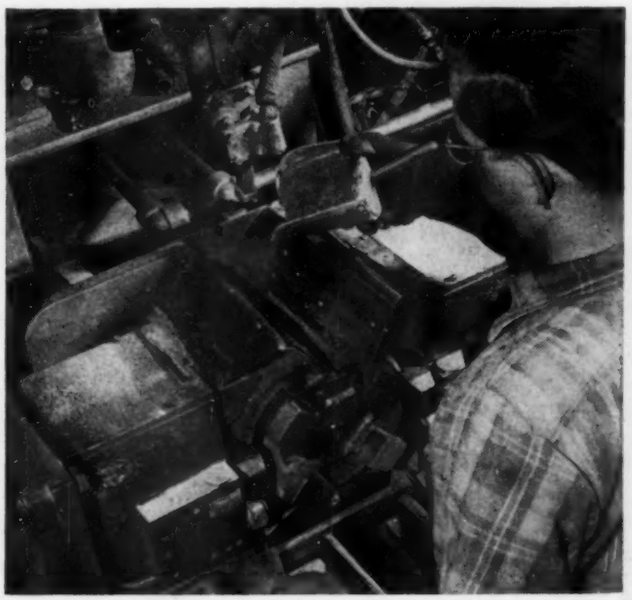
MOTOR FRAMES WELDED BY SUBMERGED-ARC

MASS PRODUCTION of Life-Line ac. motors in integral-horsepower sizes has become practicable through the application of automatic submerged-arc welding for the construction of frames and brackets



ROLLED FRAME, showing the allowable gap before welding when frame is clamped in the fixture. Note the backup bar position. The weld is started approximately ⅛ in. from the end of the joint and run about ⅛ in. into the runoff tab. Arc voltage is 28 to 30, current is 575 to 600 amp. and the 5/32-in. electrode is vertical in relation to the seam. Machine settings are based on a 7/32-in. gap and are not changed. Traverse speed increases with smaller gaps, decreases with larger ones

1 **AUTOMATIC WELDER** is used for making the joint on the roll-formed rings. The frame is placed within two pull-back bars actuated by a hydraulic cylinder to pull it onto the four locator bars. These simulate the stator laminations to control the size of the inside of the frame. Frame is clamped by large air cylinders



2 **HINGED DAMS** are positioned on each side of the frame seam to contain the flux which is sifted in place with a scoop before the welding operation is started. Flux must be applied to a uniform depth no greater than is necessary to assure reasonably quiet action and to eiiminate any tendency toward a visible arc

Using specially built machines and fixtures, motor frames are fabricated on a mass-production basis at new Westinghouse plant

BY J. B. ARTHUR

Welding Engineer Buffalo Divisions
WESTINGHOUSE ELECTRIC CORP.

DESIGN ENGINEERS worked hand-in-hand with methods and tool engineers in laying out the new Life-Line, ac., squirrel-cage, induction motors, rated from 1 to 15 hp. at 1800 rpm., with corresponding ratings at other speeds (NEMA frame sizes 203 to 326). There are but 126 component pieces for the entire line, as contrasted to 2800 parts for the line it superseded.

Automatic ac. submerged-arc welding produces all sizes of stator frames and brackets, and Oxweld No. 36 welding wire handles all three operations. Full automatic control is achieved mechano-electrically through cams, micro-switches and solenoid air valves.

Cleanliness is all-important in insuring weld quality. Clean dry granular flux is applied to a uniform depth for the entire weld length, and to a depth just sufficient to assure reasonably quiet welding without visible arc. A 10-mesh screen sifts used flux between operations, and new flux is mixed in with used flux as required to make up the volume needed. Rough welds and porosity result if this practice is not followed. Approved methods for cleaning the parts are shot or sand blasting, or cleaning with a solvent such as carbon tetrachloride or benzine, or in a caustic bath.

All work must be rigidly held in the fixtures to maintain shape and dimensional requirements.

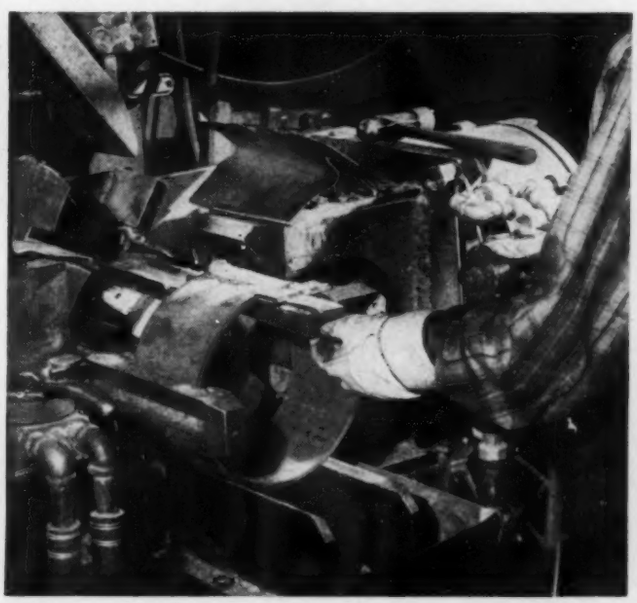
Motor frames are made from ⅜- to ½-in. rolled mild-steel plate, 9 to 12 in. wide and up to 22 ft. long. Plates are delivered by roller conveyor to a punch press where they are cut to length and pierced for lead-wire holes in one operation. Lengths of plate drop from the press to a chute leading to a coining press where the edges of the hole are beveled by a double-acting die. Cut plate is cold-rolled into circles on a heavy-duty Kane & Roach through-roll machine which automatically ejects formed frames onto a V-roller conveyor leading to the seam welders.

Frame seams are welded automatically and the completed rings passed to other automatic welders where the feet are attached. Holes are drilled and tapped for the conduit box and the unit then goes to a triple-action Watson-Stillman hydraulic press in which the stator lamination core is built up and assembled to the frame complete with locking bars. When the stator leaves this machine it is ready for final machining operations.

End brackets are made up of a drawn steel bell and hub welded together automatically. After welding, the assemblies are placed on a conveyor which carries them through a washing machine to be spray washed, rinsed, and dried by hot air. From the washer they are conveyed to a dip vat where red lead oxide primer is applied. The primer dries during the 30 min., 120 ft. trip between the dip vat and a water-wash, finish paint spray booth. Belt conveyors then carry the parts to automatic multiple-spindle chucking machines for facing and turning the pilot diameter, and to precision machines for boring the bearing recesses.

Welding machines are assembled on a welded steel frame and can be moved as a unit if necessary. Under normal conditions each seam welder can produce approximately 220 NEMA frame 254 motors, or 250 NEMA frame 204 motors per day. Daily output for foot welders is 180 NEMA frame 204, or 150 NEMA frame 254 motors. Each bracket welder will produce 540 brackets for frame 204 motors, or 520 brackets for frame 254 motors.

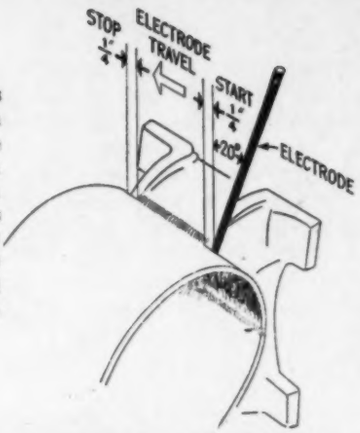
3 **EXCESS FLUX** is removed after welding with a flexible suction hose, each machine being equipped with a standard vacuum unit. Care is taken to keep the fixture and moving parts of the machine clean from dirt, slag and flux, to insure a tight fit of the work in the fixture. Equipment is cleaned at the end of each shift



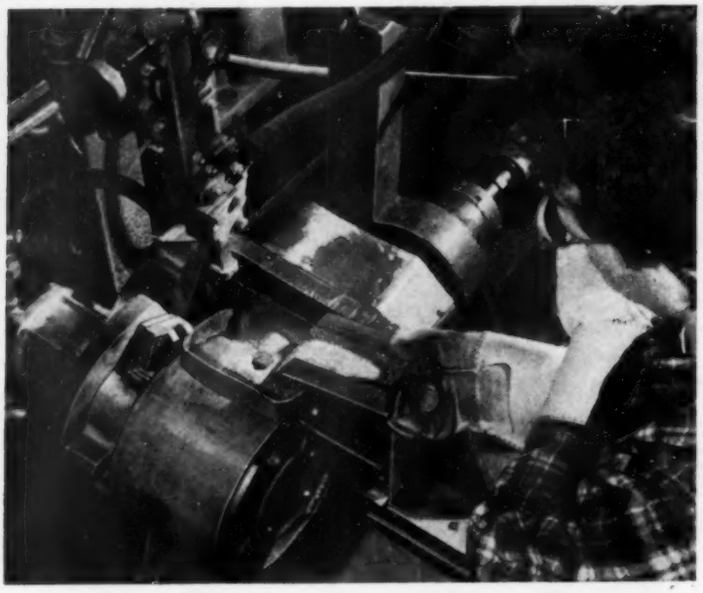
4 **BACKUP BAR** and welded frame are removed from the fixture, and the hot bar cooled in water. Two bars are available at each machine to eliminate overheating and gouging. Starting and runoff steel tabs are broken from the frame with a machinist's hammer and the frame ring is placed in a chute for delivery to a foot welder

WELDING FEET TO MOTOR FRAMES

PRESSED STEEL FEET units are submerged-arc welded on automatic machines in which the electrode is slanted 20° from vertical away from the direction of travel. Each weld requires about 20 sec. Arc voltage is 26 to 28 and current is 440 to 460 amp. A 5/32 electrode is used with 200x12 or 200x20 mesh Unionmelt grade 20 flux

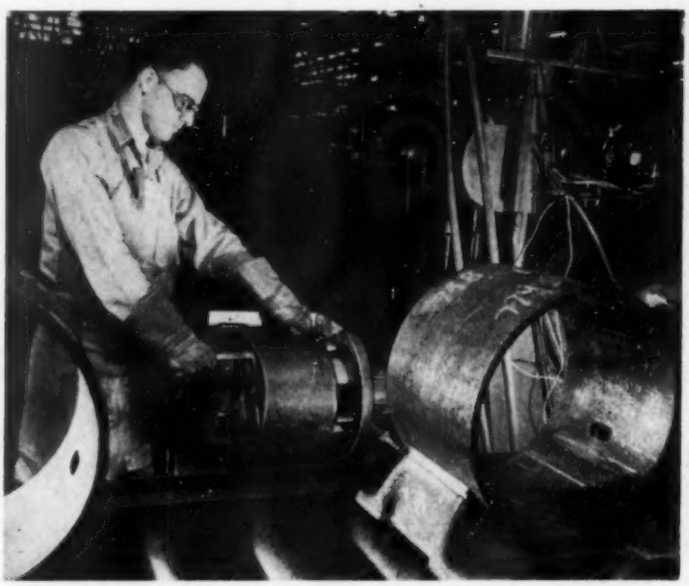


1 **FOOT-WELDING FIXTURE** locates the foot by four shoulder pins, and the frame ring is carried on four locator bars that simulate the stator laminations to maintain internal size. Weld starts approximately ¼ in. ahead of the joint and is stopped ⅛ in. beyond the joint at the other end



2 **FLUX** for submerged-arc welding one side of the foot to the frame ring is spread by hand within a hand-positioned sheet-metal dam. Automatic welding cycle is not started until flux is spread uniformly to the proper depth

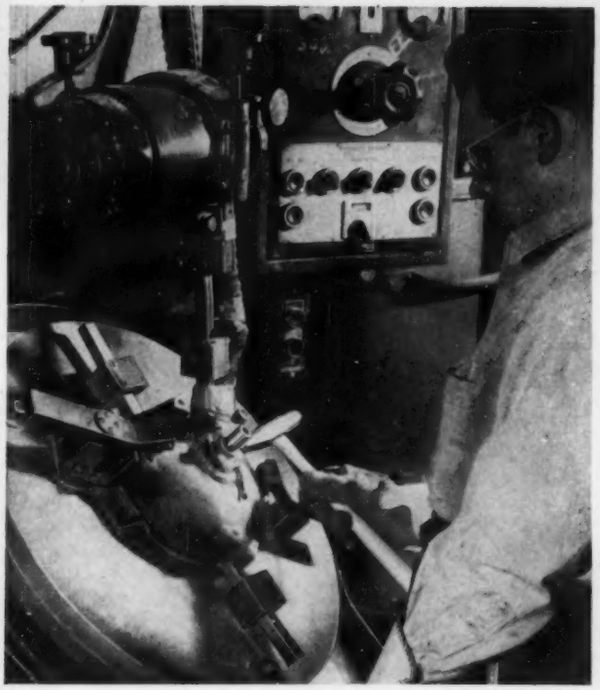
3 **ROTATING** the fixture 180° by means of an air motor brings the second side of the foot into welding position. When the second weld has been made the fixture is turned back to the original position for easy work removal



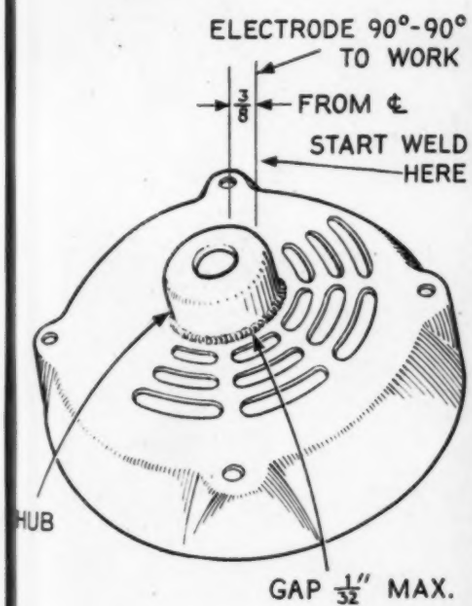
4 **COMPLETELY WELDED** frames are removed from the foot welder to a gravity roller conveyor for delivery to a two-spindle drillpress where holes are drilled and tapped for mounting the conduit box adjacent to the lead-wire hole

WELDING HUB TO END BRACKETS

1 **BELL SECTION** is centered in a quick-locking fixture which forms an integral part of the welding machine. Fixture is tilted 45° for proper positioning of the work in relation to the vertical electrode wire. After clamping, the hub member is slipped over the centering shaft and into the hole in the bell

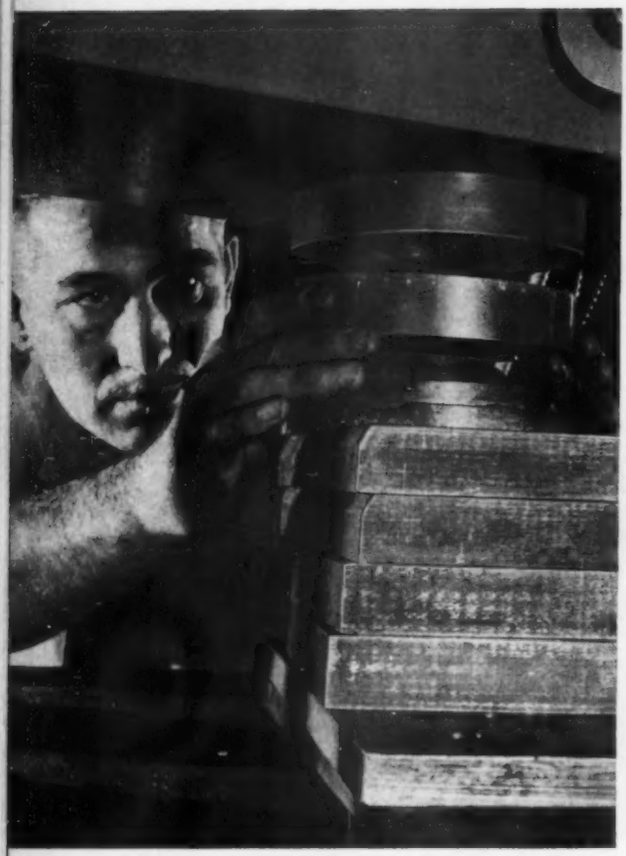


2 **FUSED FLUX** is chipped from the start of the seam while the weld proceeds. This is to prevent any flux inclusion in the overlap when the seam is completed. Flux is applied automatically through a tube connected to a hopper at the top of the machine

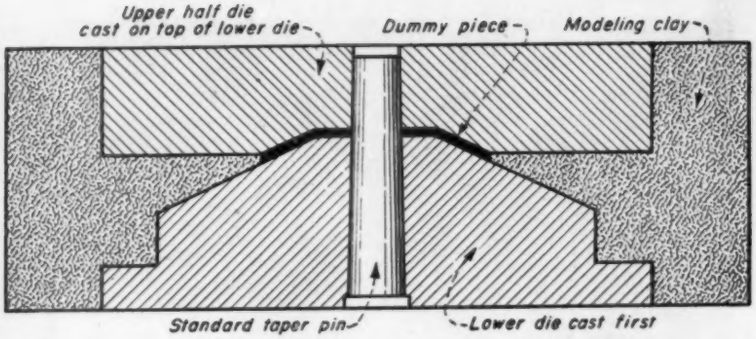


END BRACKETS for motor are composed of a pressed steel bell and a smaller hub unit. Welding time, with ⅛-in. wire, averages 31 sec. with an arc voltage of 24 to 26 and a current setting of 340 to 350 amp. Both parts are centered in a fixture and gap may vary up to 1/32 in.

3 **WELDED BRACKETS** are removed from the fixture to a table where the fused flux is chipped off by light hammer blows while the next piece is being welded. Finished bracket is hung on an overhead conveyor for delivery to cleaning and painting operations



Economy of time and labor are outstanding in Wood's metal dies for short run production



How aluminum dummy and plasticine clay are used when pouring the upper half of the die

Test specimens of Cerrobend. Left, before load test; center, after 5650-lb. load at —320 F.; right, after 5650-lb. load without cooling

Frozen Dies Form Experimental Parts

Tripling the strength of Wood's metal dies

by freezing in liquid nitrogen

makes them suitable for forming thin sheet metal parts

BY CHESTER S. RICKER
DETROIT EDITOR

TEMPORARY DIES for either experimental or very short runs usually pose a difficult problem in choice of material for minimum cost and ease of working. Fred Klemach, stress analysis engineer, Ford Motor Co., Dearborn, reasoned that Wood's metal would be ideal for the purpose if some way could be found to harden it. This material, an alloy of bismuth, tin and lead, melts readily in hot water, is very easy to cast in any kind of mold, plaster, clay, wood, metal, or even cardboard, is very easy to work, and can be reclaimed after use by melting in boiling water.

Freezing the metal seemed to offer a solution to the hardness problem, and experiments showed that freezing in liquid nitrogen would more than triple the yield point. In the chilled condition, dies were found capable of forming SAE 1020 sheet steel up to 0.040 in. thick. Very satisfactory experimental parts of intricate design can thus be made in small quantities, five or ten at a time, and if more are needed the dies can be chilled again for additional runs.

These dies have effected considerable savings in time and money. Small steel dies for experimental parts usually take six or more weeks to produce, and after they are finished, even a small change in design generally means a complete loss of the dies and the high-priced labor that has gone into them. Wood's metal dies, however, can be made from a sample wood or clay model and finished pieces produced from them in one or two days. If there is a change in design the dies can be melted and recast with the expenditure of only hours instead of weeks.

Both male and female dies are made from the same alloy. The bottom die is made in a plaster mold taken from a turned wood pattern. This is placed in a hydraulic press and covered with a sheet of aluminum of the size and thickness of the material to be formed. A heavy rubber pad is then pressed down to form the sheet to conformity with the die. This sheet acts as a spacer and also as a mask, its high conductivity preventing the new hot top

die metal from melting that in the bottom die.

Before the upper die is poured, plasticine modeling clay is built up over the lower die to protect it and also to reduce the amount of alloy required in the top die. The two halves are secured in proper relation to one another by taper pins cast into the lower die. After casting, and before the two halves are separated, the top and bottom are carefully faced off to assure perfectly parallel bearing surfaces.

After separating, the halves are examined for flaws, and any blow holes or scratches repaired with a soldering iron and a piece of the alloy. Even minor changes in the die can sometimes be made by this means and the surface smoothed up with a scraper.

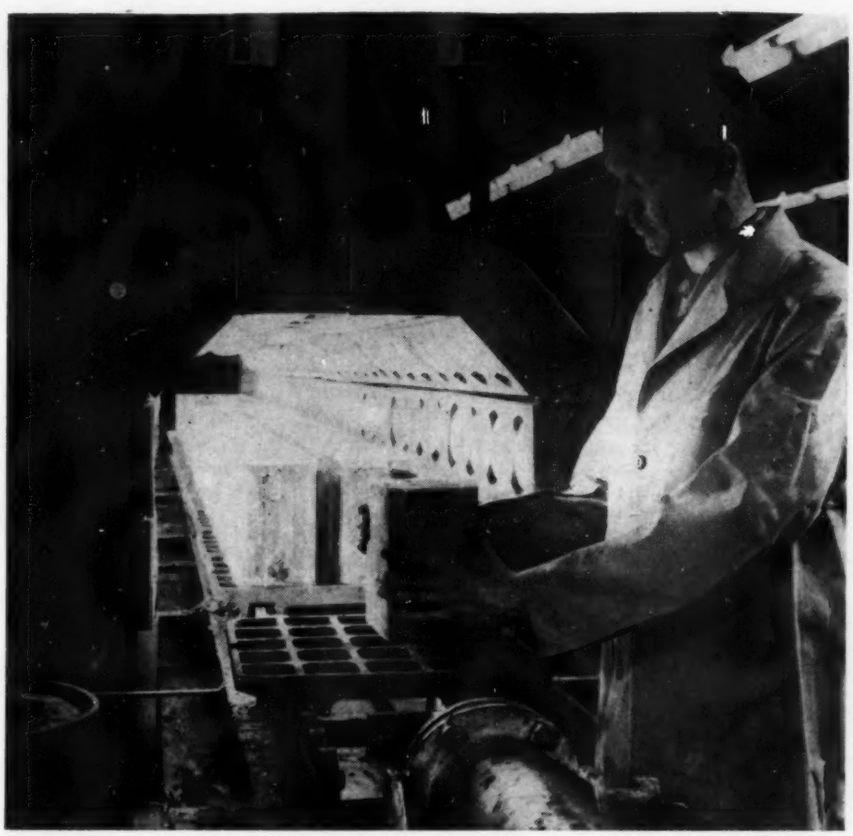
Chilling is effected by dipping the dies for a few minutes in liquid nitrogen, which is inexpensive and easily obtained. Sheets of asbestos are used above and below the dies in the press to prevent too-rapid conduction to the platens. Asbestos gloves are used in handling the dies to prevent severe burns from the minus 320 F. temperature.

Compression tests of 1-in. dia., 2-in. long samples show that the alloy begins plastic deformation at about 7500 psi., but the same test piece after chilling will stand about 25,000 psi. or better. There is no deformation when chilled, the ultimate stress and yield point being the same. The Brinell hardness test shows less than one-fourth the ball impression on the chilled piece as compared with one at normal temperature.

The material acutally used by Ford is Cerrobend, but other metals in the same category could be used. Table 1 shows the constitution and physical properties of some of these materials. It should be noted that Cerrobend expands 0.001 in. per in. during solidification and grows rapidly for 1 hr. afterwards. The growth continues at decreasing rates for 1000 hr. The total expansion is about 0.008 in. per inch.

PROPERTIES OF CERRO ALLOYS

Name	Bi	Sn	Cd	Sb	Pb	Melting Temp. °F.	Freezing Range, °F.	Wt. per cu. in., lb.	% Elong. in 2 in.	Tensile Strength	Bhn.
Cerrobend	50	13.3	10	—	26.7	158	158-158	0.339	200	5990	9.2
Cerrosafe	40	11.5	8.5	—	40.0	163	194-158	0.341	220	5400	9.2
Cerromatrix	48	14.5	—	9	28.5	—	440-218	0.343	1	13,000	19.0
Cerrobase	54.9	—	—	—	45.1	255	255-255	0.371	60-70	6400	10.2
Cerrotru	57	43	—	—	—	281	281-281	0.315	—	8000	22.0



INFRA-RED REDUCES MOLD CRACKS

DEFECTIVE castings are scarcer now since Westinghouse Electric installed this infra-red mold drying oven in its "lost-wax" precision casting plant. Replacing steam tables, low-temperature gas-fired ovens, and hot plates, 248, 250-watt infra-red lamps now dry the invested flasks more uniformly and remove 98% of the wax with much less tendency toward cracking. After drying, the flasks proceed to the preheat furnace.

TIPS for Top Shop Men

207 As the model, watch your own natural inclinations. It's fun to set in at a noon game of stud or to roll the bones—but if you do, there are those who'll take it as official sanction—and go on from there.

208 Time clocks are a "menace to liberty" just as a train schedule is. While it's nice to come and go as you please, "as long as you get your work done," there are very few men who can respect such freedom for long—when somebody else is footing the bill. It's a hard assignment, but you've got to see that time paid for is time put in on the job.

209 Use discretion on unauthorized lending of company tools for private jobs. *Some* tools can be lent to *some* men with little danger of loss or damage—but *all* tools to *all* men means trouble.

210 If you're sure of pilfering or thievery by anyone, better take the bull by the horns and get rid of him. This is one offense that deserves drastic treatment and should have it promptly.

What to Look for in Hydraulic Oils...III

VISCOSITY INDEX

Noise, wear, poor control and failure of equipment follow use of oil that thickens or thins too much with temperature change

BY ANTHONY J. ZINO, JR.
LUBRICATION ENGINEER

PEAK EFFICIENCY of a hydraulic system depends on maintenance of a viscous oil film between moving surfaces. Hence, consideration is required for two inter-related service properties of hydraulic oil: (1) viscosity (discussed in the previous instalment) and (2) viscosity index.

The viscosity index, or V. I., of a hydraulic oil is the measure of its resistance to viscosity change with temperature. A perfect fluid is one that has the same viscosity at all temperatures—but the perfect hydraulic oil does not exist. So it is essential to pick an oil with a viscosity index sufficient to avoid both thickening trouble at starting-up temperature and "thinning out" at operating or normal overload temperatures.

If this is not done, unsuitable oil will cause pump noise, scoring and wear at low-temperature starts. And at operating temperature these troubles may occur: poor hydraulic control, chatter and vibration, possible early failure by sludging of the oil through lack of oxidation stability.

To understand the importance of viscosity index, and learn how to make suitable recommendations, consider several charts:

The effect of temperature on viscosity can be demonstrated for two oils. Assume that both oils have a Saybolt Universal viscosity of 300 S.U.S. at the standard testing temperature of 100 F., but that one of these oils has a viscosity index of 100 and the other a V.I. of zero. Plot the viscosities of the two oils at various temperatures upon A.S.T.M. standard viscosity-temperature chart paper. Two "straight line" curves crossing at 100 F. will be obtained.

This method, although widely used, has its faults. The A.S.T.M. chart paper represents an expression of the Walther formula:

$$v + 0.8 = e\ KT^n$$

$$\text{i.e., } \log_{10} \log_{10} (v + 0.8) = n \log_{10} T + C$$

Where:

v = Kinematic viscosity, centistokes
T = Absolute temperature ($t°$ Fahr. + 460)
K, N, C = Oil constants

The ordinates, while marked in centistokes or Saybolt Universal Seconds, actually represent the expression:

$$\log_{10} \log_{10} (v + 0.8)$$

Similarly, the abscissa, while indicated in degrees Fahrenheit, denote the expression:

$$\log_{10} (t°_F + 460)$$

As a result, it is too often assumed that changes in viscosity with temperature are linear functions, whereas they are actually logarithmic functions.

The true significance of viscosity change with temperature can be seen from a combination chart, wherein the viscosity-temperature curve for 150 S.U.S. oil (100 V.I.) is plotted on the upper portion according to the A.S.T.M. method and below by the ordinary graph method. This chart demonstrates convincingly the rapid rise in viscosity with a decrease in the temperature, and vice-versa.

At once it is seen that the designer and operator of hydraulic equipment has a real problem on his hands in selecting a hydraulic oil. For he must make compromises to compensate for the extreme changes in fluid-film thickness and viscosity that occur in oils over the temperature range from room temperature to maximum operating temperature of 120-160 F.

So viscosity index is important. And much study has been given to evolving a method for rating petroleum oils with respect to this property. The presently accepted method is based on the work of E. W. Dean and G. H. B. Davis. By their method, viscosity index of the unknown oil represents a comparison with two standard oils, arbitrarily chosen so that all three oils have the same viscosity at 210 F. The formula given in the A.S.T.M. designation D-567-41 is:

$$\text{V.I.} = \frac{L - U}{L - H} \times 100$$

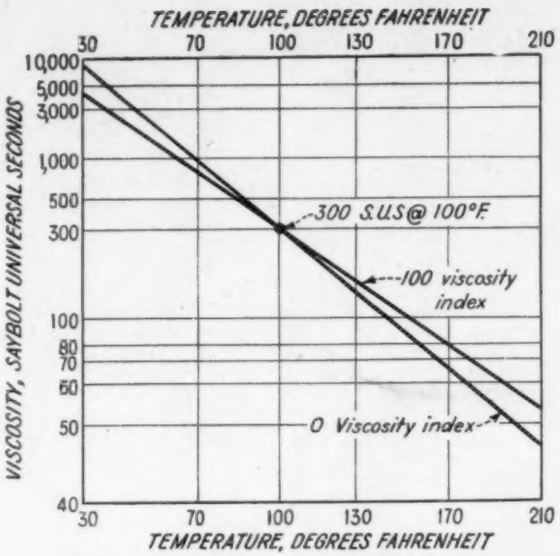
Where:

U = Viscosity at 100 F. of oil under investigation
L = Viscosity at 100 F. of zero V.I. oil having same viscosity at 210 F. as oil under investigation
H = Viscosity at 100 F. of 100 V.I. oil having same viscosity at 210 F. as oil under investigation.

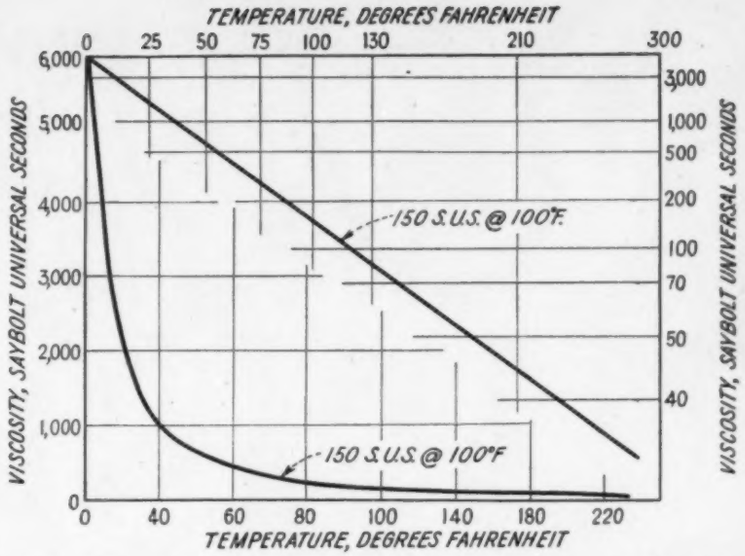
Tables of values for L and H, in S.U.S. or centistokes, are obtainable from the American Society for Testing Materials to assist calculations. Nomographs based on the Dean-Davis formula have also been prepared to determine V.I. without calculation.

If attempts are made to determine V.I. of an oil, care must be exercised to obtain the exact viscosity at 210 F., because a slight error at this temperature will affect the V.I. determination by many points.

Petroleum oils are practically in universal use as hydraulic fluids because of their availability, lower first cost and ease of handling and application. But petroleum oils vary in ability to resist temperature-viscosity changes, depending on origin of crude, refining method, handling, subsequent processing. All of these factors have a direct bearing on the viscosity index of the finished product. The relationships for oils from three sources are given on next page.



Viscosity-temperature relationships of hydraulic oils are normally plotted on A.S.T.M. viscosity-temperature chart paper (D341-39). The resulting "straight-line" curves express logarithmic functions and may deceive the uninitiated with respect to the drastic changes in viscosity at different temperatures



More dramatic comparison of the effect of temperature on viscosity is obtained by plotting the results in two ways: on A.S.T.M. chart paper above, and by the ordinary graph method below. For a 150 S.U.S. oil, it is obvious that viscosity rises rapidly at temperatures below the reference temperature of 100 F., even though the oil has a viscosity-index rating of 100

VISCOSITY-INDEX
RANGE OF PETROLEUM OILS

Source of Crude	*Refining Method* *Conventional*	*Solvent-Extraction*
1. Pennsylvania	85-100	100-125
2. Mid-Continent	60- 80	85-100
3. Gulf Coastal & California	0- 40	40- 65

So far, the importance of viscosity index has been discussed, likewise the method of calculation, but nothing has been said about how to keep out of trouble. From years of field research and cooperation with manufacturers of hydraulic pumps and equipment, it is evident that there are five important temperature zones in operation of hydraulic equipment:

1. Dangerous low temperature start-up zone—0 to 60 F.
2. Normal start-up and warm-up zone—60 to 90 F.
3. Recommended viscosity-temperature operating zone—90 to 160 F.
4. Critical operating zone—160 to 180 F.
5. Dangerous high-temperature operating zone—180 to 250 F.

And, in addition, the four most generally used hydraulic fluids are: 150, 300, 525 and 950 S.U.S. at 100 F.

The viscosity-temperature relationships of these four oils with viscosity indexes of 100 throughout the five temperature zones have been established by the author on A.S.T.M. viscosity-temperature chart paper. By the use of this chart, the designer or operator can select an oil that will avoid or overcome pump and hydraulic circuit troubles.

This is how the chart is used:

First, consider the start-up zone. If the fluid or equipment temperature is below 60 F., the fluid must perform in the dangerous viscosity-temperature range. Frictional losses and additional resistance to pump and valve action are characteristics of fluid operation in this zone, because of the increased oil viscosity. There is also a tendency for the pump to rattle or be noisy. More serious is the danger of starving the pump, to cause scoring and wear through loss of lubricant. Fluidity at low temperatures, the pour-point characteristics of the oil, must be considered when operating a hydraulic circuit in this zone.

A start-up temperature of approximately 60 F. is as low as is safe ordinarily, considering the serious damage that can occur in the low-temperature start-up zone. Fortunately, most types of hydraulically operated industrial equipment start up at a temperature between 60 and 90 F., which is the normal start-up and warm-up zone. And if the normal start-up temperature is close to mean operating temperature, less time is lost for warming-up purposes.

Second, consider the "recommended viscosity-temperature operating zone." The temperature range from 90 to 160 F. represents a compilation of recommendations from pump manufacturers to secure optimum efficiency. If equipment is operated with 100 V.I. fluids at temperatures within this range, efficient hydraulic performance will be secured and there will be ample margin of safety with respect to oxidation stability of the oil.

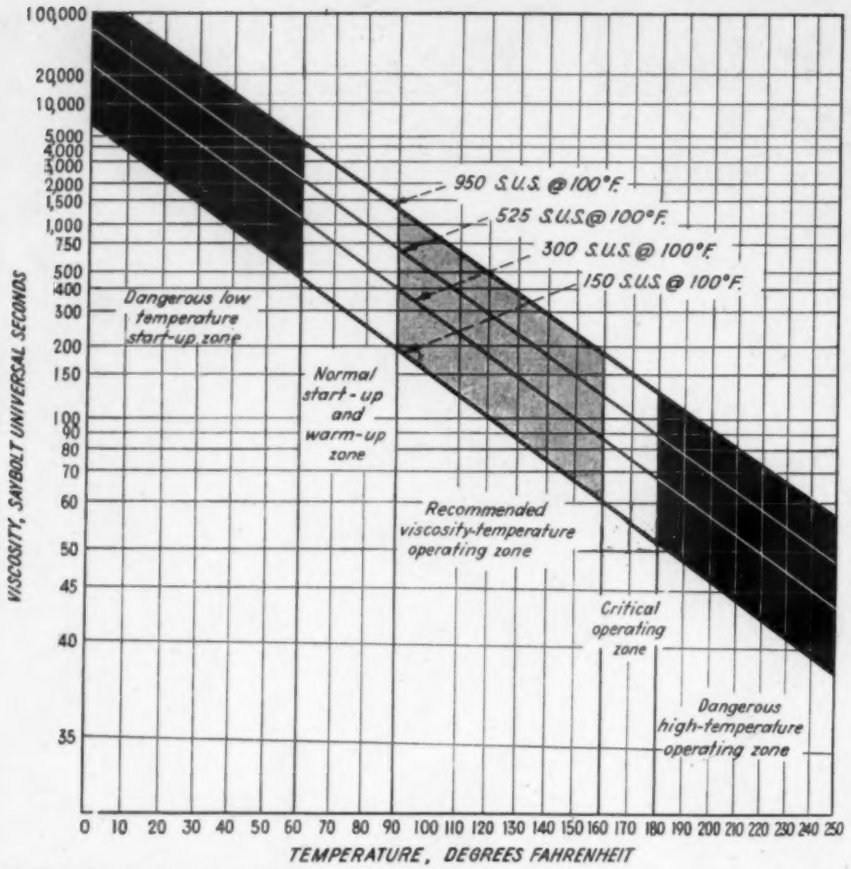
Suppose that a change in hydraulic fluid must be made in order to maintain the recommended viscosity at an elevated temperature. This is how it is done. Assume that the pump manufacturer recommended a 150 S.U.S., 100 V.I. hydraulic oil for an operating range of 90 to 100 F., but the circuit constantly operates at 130 F. Refer to the accompanying viscosity-selection chart.

On the curve for 150 S.U.S. oil, find the point where it intersects the 100 F. ordinate. Naturally, the corresponding viscosity is 150 S.U.S. Move horizontally to the right from the stipulated point until the 130 F. ordinate is reached. Here it so happens that the 300 S.U.S. cuts the 130 F. ordinate. Therefore, to cope with the operating temperature indicated by an actual check of the equipment, one would specify a 300 S.U.S. oil of 100 V.I.

Third, it is important to know the viscosity characteristics of hydraulic fluids operating in the critical zone—160 to 180 F. A great many hydraulic circuits must operate in this zone.

The critical operating zone is important because of three reasons:

1. The effect of elevated temperature on oxidation stability of oil.
2. The effect of elevated tempera-



Viscosity selection in S.U.S. at 100 F. reference temperature is made easier by this five-zoned chart. If the oil is too "light" for the actual operating temperature, one can pick the 100 V.I. oil that does have an adequate S.U.S. viscosity for maximum efficiency

VISCOSITY INDEX *continued*

ture on the accuracy and efficiency of the machine.

3. The effect of elevated temperature on fluid viscosity and volumetric efficiency of the pump.

Every effort should be made to design equipment to keep operating temperature of the hydraulic fluid below 180 F. But evidence has been amply obtained to prove that "hot spots" often exist in hydraulic circuits. Look for them.

Fourth, avoid operating temperatures in the "dangerous high-temperature operating zone" from 180 to 250 F. This operational region drastically impairs pump life and efficiency. It also results in poor hydraulic control, chatter and vibration, and destructive effect on oxidation stability and life-expectancy of the fluid.

Effects of Low V.I. Fluids

Although the effects of temperature on the viscosity characteristics of 100 V.I. hydraulic fluids were noted on the A.S.T.M. chart, a similar chart could be devised for lower V.I. hydraulic fluids. However, experience has shown that, where no effort is made to control the fluid's temperature in service, hydraulic operation with low V.I. fluids is more erratic and less efficient. Furthermore, maintenance of uniform oil pressures and constant mechanical feeds are difficult under such conditions.

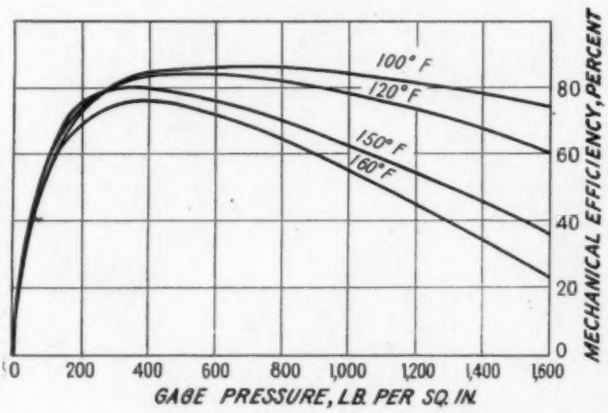
It is also evident that viscosity of relatively low V.I. fluids in both the "low temperature" and "normal start-up zones" would be much greater than with higher V.I. fluids. Consequently, a more serious operating problem would occur in these temperature zones. Shearing losses, as well as the possibility of pump starvation, are much greater. Operation of hydraulic equipment becomes more difficult because the systems are more sluggish and require considerably more time to warm-up and function smoothly. Where labor costs, as well as machine hourly rates, are high, the extra warm-up time is expensive.

When using low V.I. fluids in the "recommended viscosity-temperature operating zone," it is suggested that fluid temperatures be accurately controlled. The reason is that a slight increase in temperature results in a relatively rapid drop in viscosity. This condition is not conducive to accurate hydraulic control or efficient machine operation.

The use of low V.I. fluids is not desirable in either the "critical" or "high-temperature operating zones" because they eventually bring about serious mechanical problems and complications. The thermal stability of the oil film at these elevated temperatures is also adversely affected. Leakage and inability to maintain uniform oil pressures are characteristics.

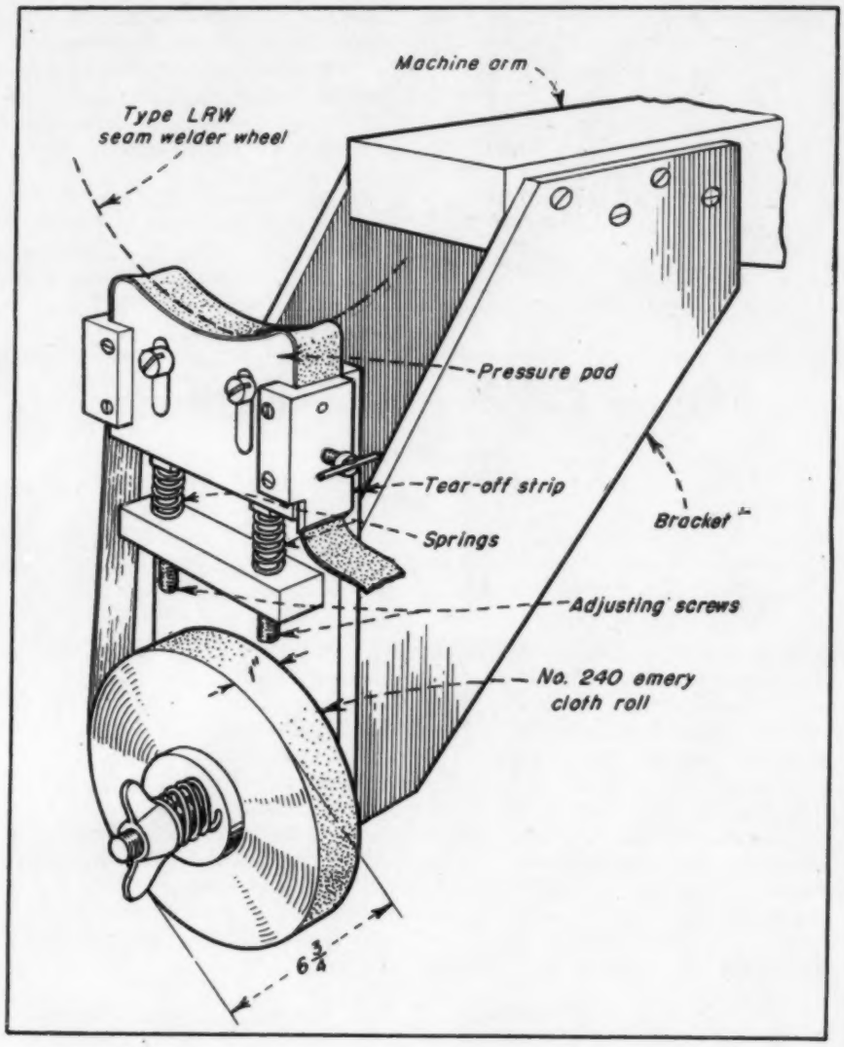
There is no question that the viscosity index of a hydraulic fluid is an important physical property and highly essential to efficient hydraulic operation. An accompanying chart illustrates the effect of temperature and pressure on the mechanical efficiency curves of a hydraulic pump using a hydraulic fluid with a 75 V.I. The use of a hydraulic fluid with a higher V.I. would be reflected in greater efficiencies at all temperatures and pressures.

Part IV—Demulsibility will appear in an early number.



Pump efficiency falls off rapidly with increase in oil temperature. The effect is more marked with an oil having a viscosity index of less than 100. These curves show behavior of a rotary-vane constant-displacement pump when a 75 V.I. oil was used

Practical Ideas



Seam Welder Cleaning Attachment Improves Weld Quality and Finish

Clean metal is often a prerequisite to successful work on all kinds of jobs. But in spite of good housekeeping, dirt and other foreign material does collect at times. In the spot-welding or seam-welding process, any dirt which comes between the work and the electrodes greatly increases the already-high electrical resistance and reduces the efficiency of the machine by demanding a higher voltage to gain the necessary heating. Further, this variable dirt factor upsets calculations and the resulting weld will be uneven in quality as well.

Of even greater significance, many kinds of "dirt" will fuse when heated under pressure in this manner, and will stick to the rollers, forming a cumulative layer or coating which will destroy the weld quality at an increasing rate, in addition to seriously marring the work surface in some cases.

This device is no substitute for clean metal by any means, but because it functions automatically whenever the rollers roll, any dirt accumulation is eliminated, and a freshly-polished roller is always ready for the work. Imperfections now are confined to the variations in the work surface itself, at least, and at worst, these are greatly reduced by the device.

The device consists of a double-arm bracket two of which are attached to each arm of the machine. At the bracket end is a 1-in. roll of emery cloth and a concave sliding spring block arranged to bear rather heavily against the roller. The emery cloth is fed over this concave block and two side plates clamp it tightly in place. The roll and a tear-off strip make it conveniently simple to advance the cloth tape frequently without delaying the flow of work in any way.

Adjusting screws are provided to vary the contact pressure as required and a spring and wing nut on the emery cloth roll keeps the tape from unwinding yet doesn't prevent feed when the end is pulled. *Charles Kidwell, Wichita, Kansas.*

Counterweight Eliminates Push-Pull Slack

In contouring operations where a floating toolholder is guided along a cam templet, or follows a radius bar or similar device, occasions arise when the guide pressure shifts from one side to another. Of course, tension cables are used very commonly on many single-guide lathe setups, but for some unknown reason the idea is often forgotten when it comes to the radius bar arc-cutting method which has been described several times in these pages. Too often, the designers forget about ordinary working clearance required in all pivots, which grows in time with use, and carriage reversal will nearly

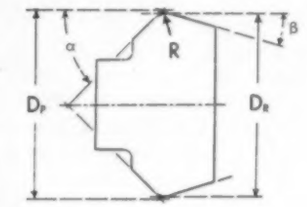
always result in a jump on the work surface.

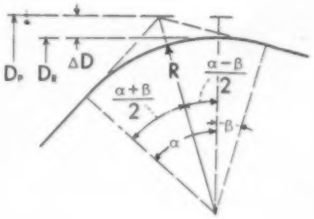
Obviously, the radius-bar technique is the simplest for circular profiles, but not so obvious, apparently, is the fact that the tension cable can just as well be applied here, too, and eliminate tedious touching up, or cutting inward from both ends to remove the dead spot in the center as one article described. *F. M. A'Hearn, Greenville, Pa.*

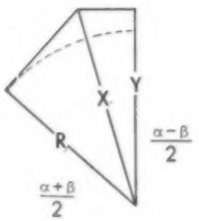
HOW TO FIND ACTUAL DIAMETER OF ROUNDED BEVEL GEARS

KNOWN: *projected diameter, D_p, face & edge angles, β & α & corner radius, R*

FIND: *rounded diameter, D_R*







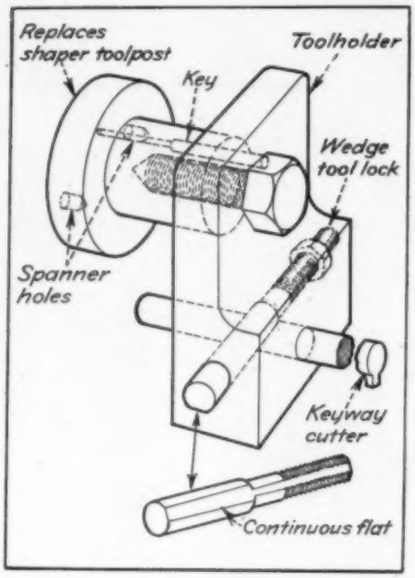
SOLUTION: $D_R = D_p - 2\Delta D$

$\Delta D = Y - R$

$Y = X \cos \frac{\alpha-\beta}{2}$

$X = \frac{R}{\cos \frac{\alpha+\beta}{2}}$

Hubert G. Smith, Birmingham, Mich.



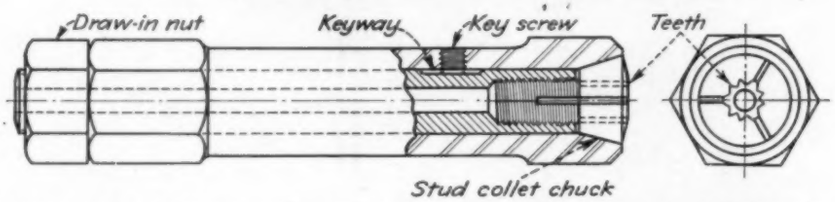
Shaper Toolholder Provides Unusual Positioning Combinations

Replacing the toolpost, this toolholder permits an almost infinite range of rapidly-set tool positions for unusual die work in confined locations.

Round barstock tools fit into a hole in the lower part of the rectangular portion where it is locked with a tapered wedge pin. This construction allows any amount of longitudinal extension so the tool can reach well into small holes.

When desired, the bar can be turned while the tool is located in the work. To make the adjustment it is only necessary to loosen the wedge nut and wedge. *George A. Giller, Glen Ridge, N. J.*

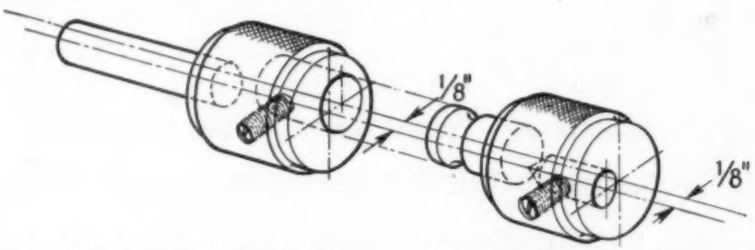
Hand Collet Removes Studs



Aircraft and automotive service work often calls for the removal of studs which have broken off close to the surface of some machine part. This tool will remove them easily even if they project as little as 1/16 in.

The collet itself has sharp longitudinal serrations or teeth and when ready for use, the points should form a diameter slightly smaller than the major thread diameter. In this position the extractor tool is driven on the stud with a hammer so the teeth will cut through the exposed threads. Then the collet is tightened with wrenches, giving a perfect grip, and the whole unit with stud is turned out of the hole.

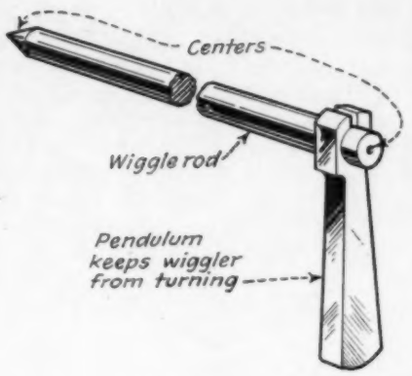
Tool construction provides for quick and easy collet changes to accommodate different stud sizes, and though shown with plain hex heads, the body and draw-in nut could be furnished with permanent large T-handles. *J. R. Paquin, Worcester, Mass.*



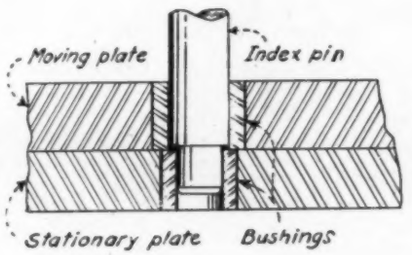
Eccentric Boring Chuck Simplifies Flycutter Milling and Boring

Designed for lathe boring in conjunction with the milling attachment, this double-eccentric chuck can hold boring bars anywhere from dead center out to considerable eccentricity by means of a convenient adjustment. It is applicable to jig borers and milling machines.

I have provided mine with index marks to show the dead center position but the periphery of one member could be graduated in thousandths to show the amount of increase over base diameter as the front eccentric is turned. *George A. Giller, Glen Ridge, N. J.*



Pendulum Wiggler—Dial indicating to find a center with the aid of a wiggle rod has one weakness. If the wiggler point somehow should be the slightest bit eccentric with respect to the body of the rod, and the rod rotates, as it surely will, you will never get anywhere. Addition of a pendulum made from a scrap of steel or brass prevents the wiggle rod from rotating, and it doesn't matter now whether the rod is egg-shaped or not. Further, the wiggler can be removed and replaced at any time and the setting will be unchanged. *Edward M. Mikkelsen, Chicago, Illinois.*



Stepped Pin Minimizes Wear

Indexing devices operating on the sliding-pin principle lose accuracy and develop play and looseness after considerable use. This wear can be reduced and tool life thereby increased if the indexing pin is stepped or made with two diameters. By the straight-pin method, the locking part has to retract and slide within the upper plate where it is wearing and getting smaller all the time. When it is tapered or stepped, the portion which seats in the lower plate is not called upon to do other than just that, and it cannot wear except when in actual contact. *Cliff Bossman, Dayton, Ohio.*

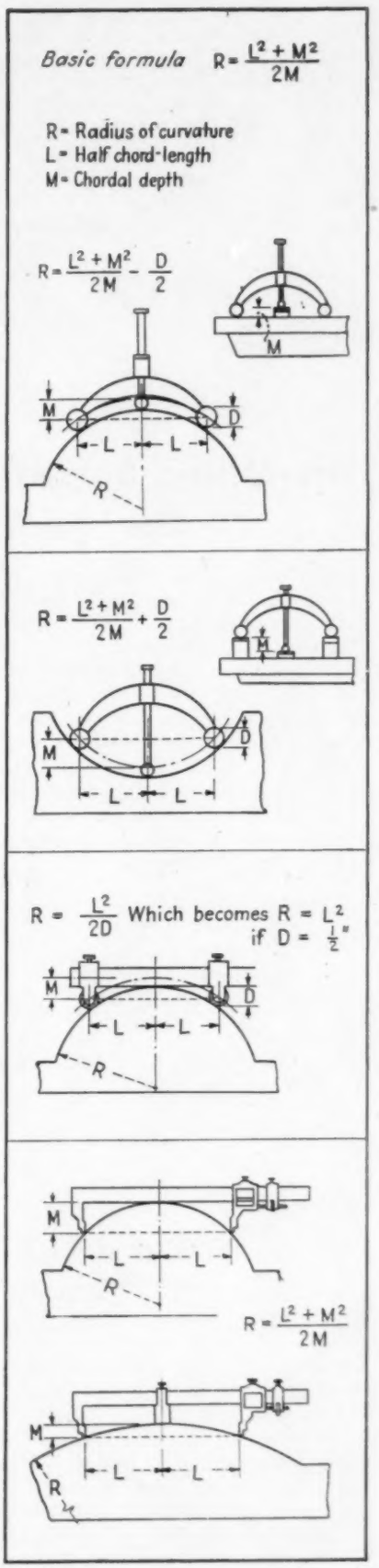
Measuring Convex Arc Radii By the Chord Method

In a recent issue, in these pages, I discussed some methods of finding radii of grooves. A complementary problem is encountered in measuring radii of cylinders or convex arcs. The same basic formula as given for groove radii is also applicable here. In practice, the measurement can be based on a constant chord length, with the depth from surface to chord varying, or on constant chordal depth with the chord length variable.

A crescent-shaped frame carrying toolmaker's buttons at each of its horns and a slidable button at the midpoint of the frame makes the instrument for the fixed-chord measuring method. The slidable button travels on a rod passing through the frame in such a way that the button is always on the perpendicular bisector of the chord line between the two end buttons. The instrument is capable of high accuracy and its range of application is almost infinite; it is equally capable of measuring concave arcs.

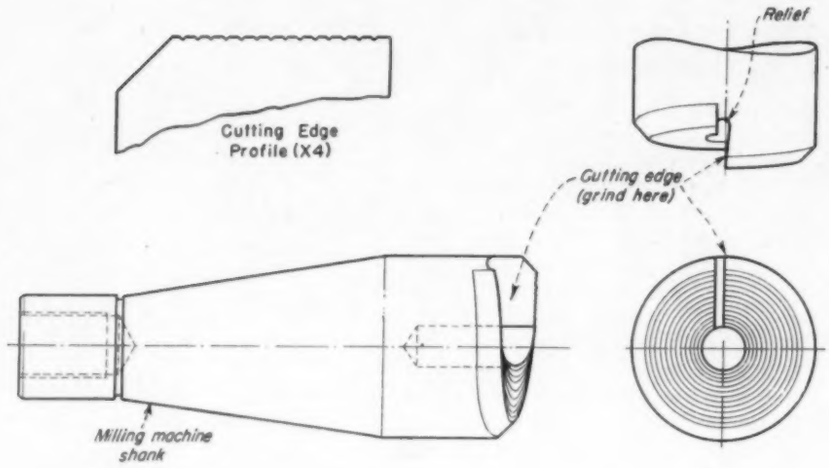
For the alternate method, one device consists of a straightedge equipped with two toolmaker's buttons mounted on U-brackets. This was described previously for measuring concave arcs, but its application here is even simpler. Not only has it all the features of the first device but also it is simpler to construct and the formulas are simpler too. If half-inch buttons are used, the formula boils down to $R = L^2$, and then it becomes a simple matter to graduate the straightedge to read the radius directly, if desired. It is interesting to note that as the buttons always contact the edge of the square, M always equals D, which accounts for the elimination of M from the formula.

The standard vernier caliper can be used in the same way, and its limited range is extendable, as larger radii are encountred, by resting the caliper on a block in order to maintain the three-point contact required. *S. Framurz, Bombay, India.*


Basic formula $R = \frac{L^2 + M^2}{2M}$
R = Radius of curvature
L = Half chord-length
M = Chordal depth
$R = \frac{L^2 + M^2}{2M} - \frac{D}{2}$
M
D
L
L
R
$R = \frac{L^2 + M^2}{2M} + \frac{D}{2}$
$R = \frac{L^2}{2D}$ Which becomes $R = L^2$ if $D = \frac{1}{2}$"
$R = \frac{L^2 + M^2}{2M}$

Arc measurements boil down to two systems: measuring a variable chordal height while the chord length remains fixed (above) and vice versa (below)

The Practical Ideas on this page are by Charles Kidwell, Wichita, Kansas



Die-Milled Serration Cutter Can Be Reground Indefinitely

Concentric serration cutting presents several unusual problems. As teeth are arranged along a work radius, the side clearances must be carefully calculated so they will not interfere as the cutter revolves. With this in mind, it seemed just as simple to go ahead and make the tool in a full circle, with the end relieved in a constant-pitch helix. In this manner, the tool could be reground almost indefinitely by sharpening along the radius, the same way thread tools and other form tools are.

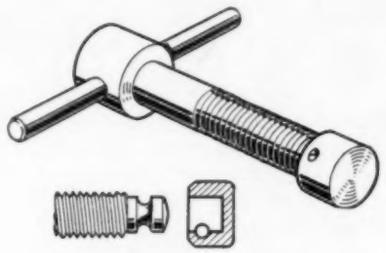
One thing that is tricky about this tool is that the end surface must be considered as a right helicoid (like a circular staircase) where every radius is perpendicular to the rotating axis but the helix angle varies in order to keep the pitch constant.

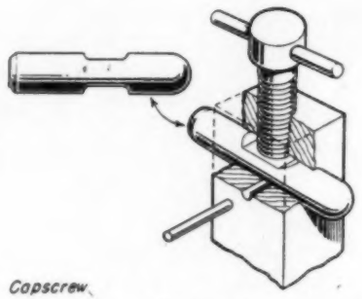
The tool was made on a die mill and heat-treated afterward, using considerable care to prevent scaling and warping.

Jig and Fixture Ideas

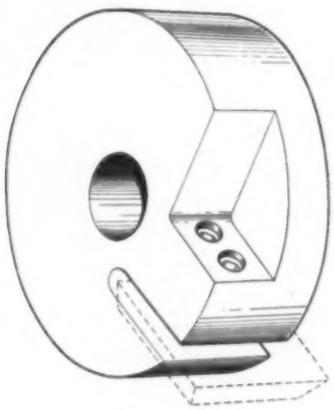
These three little gimmicks represent the kind of standard parts which can be made up in quantity in slack periods and held in reserve for inclusion in special fixtures as needed, thus saving time when a customer wants something fast.

The swinging clamp can reach over considerable obstruction and hold





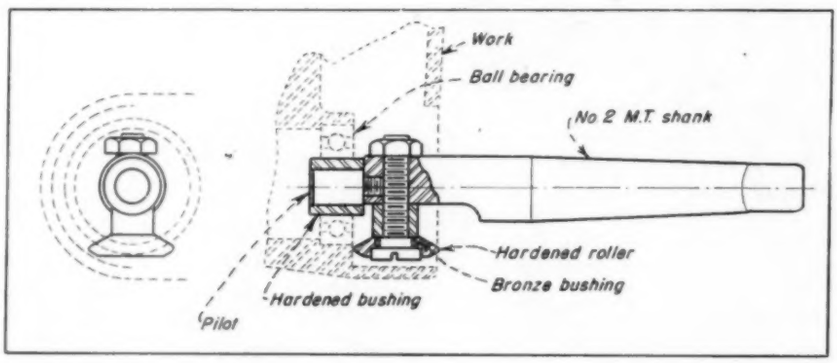
work where holding is needed. The non-marring swivel shoe is a "must" for all direct-bearing clamps, like the swinging-arm clamp, for instance. The push jack pin a simple fast-acting leveling foot or positioner which can be set in a jiffy.

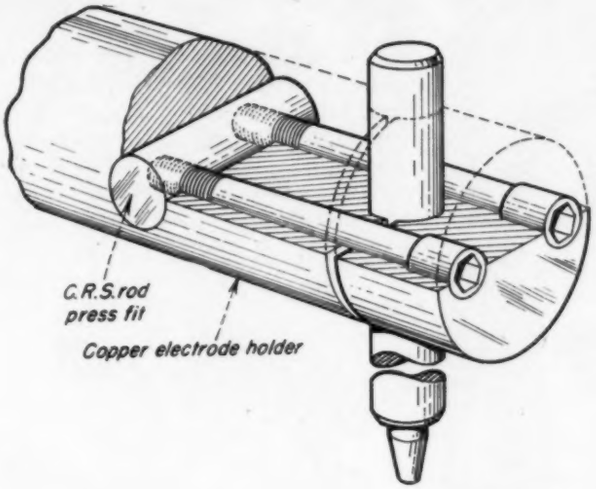


Heavy-Duty Fly Cutter—Here's a toolholder to fit a milling machine arbor which will take various flat-blade cutters. In this way, various forms can be cut on a trial or individual basis where high-production is not required without complicated setups or expensive, multitooth special cutters.

Roller-Staker Spins Bearings Neater, Stronger

Neater, stronger, faster staking is accomplished with this tapershank drillpress tool which takes the place of the usual punch-typed operation. The tool centers itself by means of a suitable bushing adapter in the bearing bore while the roller arm radius is adjustable to suit the bearing's O.D.





Clock Spring Retracts Miller Table in Automatic Cycle

Incalculable time was saved in the cutting of a lot of 624-tooth spur gears with the introduction of this automatic cycling arrangement. Table feed and automatic indexing for the work between dividing head and tailstock center are standard practice. During the cutting stroke, however, the feed screw winds up a stiff clock spring mounted behind the hand-traversing wheel on the table feed screw. When the stop disengages the clutch, the spring unwinds and rapidly returns the table to starting position where a rubber bumper absorbs the momentum without shock. The clutch is re-engaged as the dividing head is indexed and the machine proceeds to cut the entire gear without human attention. *Burl W. Mansberger, Long Island City, N. Y.*

Tapped Cross Plug Repairs Worn Electrode Holders

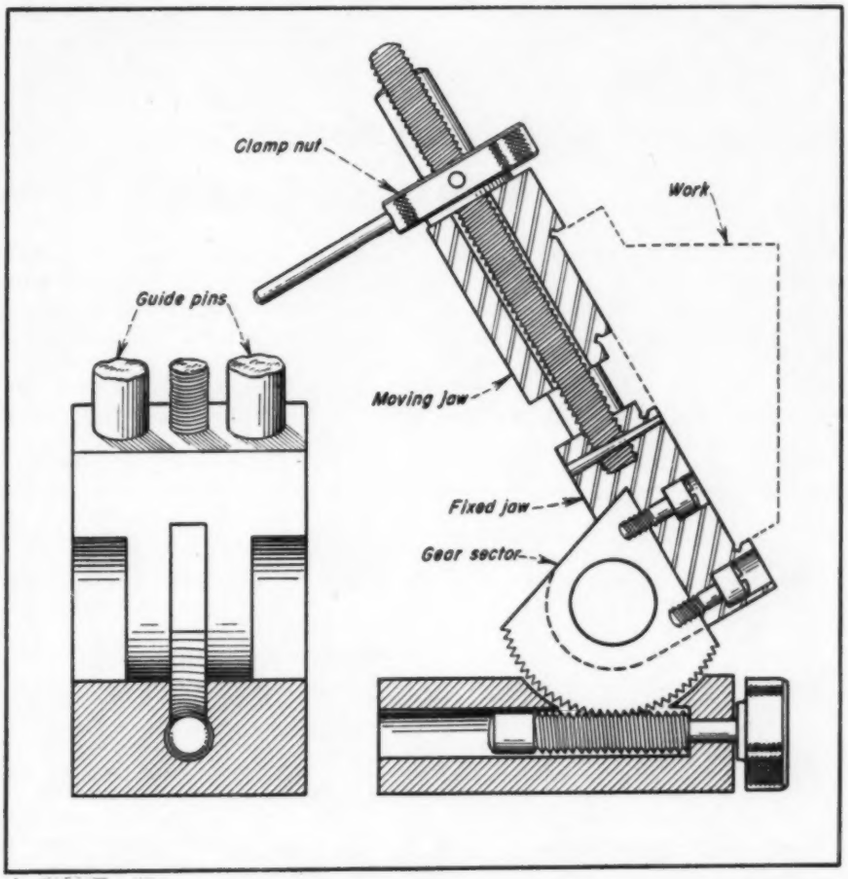
Stripped threads are a common occurence with copper electrode holders for spotwelding machines. The difficulty is easily remedied by drilling across the holder through the tapped hole. A cold rolled steel plug is then driven in tightly, and is in turn, drilled and tapped to hold the electrodes as before. This provides a stronger and longer lasting fitting with almost no sacrifice in electrical conductivity. *J. R. Paquin, Worcester, Mass.*

Hot Spinning Flares Tubes

Bell-mouthing and 45° flaring some 1½ x 0.035-in. steel tubes seemed to defy conventional forming methods until heat was included in the operation as the ductility was too low when cold.

After making this discovery, we returned to one of the unsuccessfully attempted methods, correcting the difficulty. The stock was collet-chucked in a lathe over a solid core to prevent crushing, and the lathe was run at highest speed. The carriage, with a piece of steel barstock in the toolpost at 45° to the work axis, was brought to bear firmly against the work. Soon the work became red hot and then additional pressure was added, forming the tube easily.

Special-shape bell mouths were successfully formed by the same method substituting a collet-die for the standard collet. Or, instead of a whole collet, the die could be a simple slip-on flared bushing. A piece of rod makes the forming tool. *B. L. Wade, Coffeyville, Kansas.*

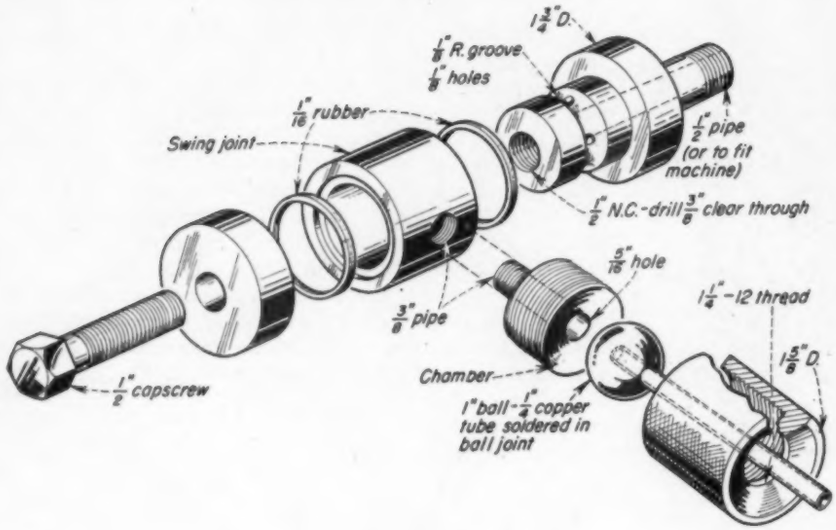


Geared Angle Vise Speeds Die Work

When filing and grinding the contours on form dies, the angle vise shown has proved useful both on a surface grinder and on the bench. Size could easily be varied to suit the requirements, but the one illustrated was built to close on ¼ in. on the lower step and 4 in. on the upper step eliminating necessity for adjusting the jaw over extreme ranges.

The angle is set with a height-gage sine bar. A piece of gage steel, 4 in. wide, is clamped in the vise so it extends laterally about 1 in. beyond the vise jaws. The sine bar is slipped under this protruding section of the gage steel to adjust the vise angle.

This vise was made with a 5/16-in. screw threaded the full length. The nut turned down from 1-in. cold-rolled steel has holes to fit a ⅛-in. dowel for locking. *J. A. Peterson, Chicago, Ill.*

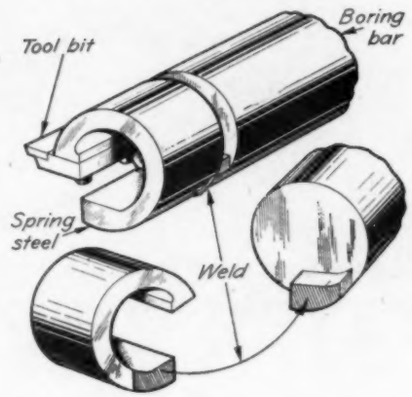


Swing and Ball-Joint Fitting Adjusts Cutting Oil Flow

With ability to swing 360° in one plane and in all directions within a 60° cone from the swinging arm, this coolant or cutting-oil fitting distributes fluid exactly where needed on milling machines, lathes, saws, in fact, nearly any production machine.

When the knurled rings are hand-tight, the unit is rigid and stays put, yet adjustments are easy to make.

The swing joint is threaded to fit the connections already on the machine, and the ball unit may be coupled directly to the swing member, or separated by a short piece of pipe, as required. Quarter-inch copper tube is soldered into the ball, and this may be of any desired length, and have any kind of nozzle at the end. *L. H. Hardcastle, Port Arthur, Texas.*



Spring Boring Bar — The most neglected tool in our machine shops today is the spring tool. When they are used at all, they are often crudely made and difficult to use. Here is one, using alloy spring steel and a carbide-tipped bit which should meet every requirement. *Chris Winkler, Portland, Oregon.*

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(in addition to regular payment for all exclusive contributions published)

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

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Judges—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, will hereafter select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. The decision of the readers will be final in each case.

Requirements—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

Who May Enter—Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

Fortieth Selection—Ching-Fu Chen's Lathe Makes Hour-Glass Worms

NEWS OF METALWORKING

A. G. Bryant
(President)

L. D. McDonald
(1st Vice President)

David Ayr
(2nd Vice President)

Sales Drive, Tax Reforms Urged by NMTBA

HOT SPRINGS, VA.—A vigorous sales drive to capitalize on the benefits of the Machine Tool Show and to prove to customers that machine tools must be bought on the basis of performance in reducing costs.

An aggressive public relations program to sell the benefits of modern machine tools to the general public and to top management.

A revision of the nation's tax policies, including permission to depreciate machine tools more rapidly.

Better training of salesmen, who should have some basic knowledge of industrial engineering.

These were among the recommendations of speakers at the forty-sixth annual meeting of the National Machine Tool Builders' Association at The Homestead, Nov. 17-18.

Alexander G. Bryant, vice president Cleereman Machine Tool Co., Chicago, and Green Bay, Wis., and president Bryant Machinery & Engineering Co., Chicago, was elected president of the association to succeed Herbert H. Pease, president New Britain Machine Co., who presided at all the sessions.

McDonald Named Vice President

Lloyd D. McDonald, vice president Warner & Swasey Co., Cleveland, was named first vice president, and David Ayr, president Hendey Machine Co., Torrington, Conn., second vice president. Louis Polk, president Sheffield Corp., Dayton, Ohio, was reelected treasurer.

New directors are M. A. Hollengreen, executive vice president and general manager Landis Tool Co., Waynesboro, Penn.; Harold B. Smith, president Illinois Tool Works, Chicago; and Mr. Ayr.

An eight-point program of tax reform was advocated by Frederick S. Blackall, Jr., president and treasurer Taft-Peirce Mfg. Co., Woonsocket, R. I., and chairman of the association's committee on fiscal problems:

1. Liberalization of depreciation allowances to permit the taxpayer to establish his own rates, provided he follows them consistently. Depreciation in any year to be taken only to the extent that it results in a tax saving.

2. Repeal of Section 102 of the Internal Revenue Code which provides for a penalty tax on unreasonable accumulation of surplus, or its modification to apply only to cases of deliberate tax evasion.

3. A three-year carry-back and a six-year carry-forward.

4. Immediate ceiling of 60% on surtax rates and ultimate ceiling of 50%.

5. Reduction in capital gains tax and full recognition of capital losses for tax purposes.

6. Elimination of double taxation of corporate dividends.

7. Extension of community property principle of federal income taxation to people of all the states.

8. Elimination from gross valuation of a decedent's estate of insurance carried by the decedent, at least to the extent of the amount of tax payable.

Mr. Blackall claimed that "the taxpayer himself is a far better judge of the needs of his business than an internal revenue agent who is rated on his ability to squeeze out of the taxpayer all that the traffic will bear." He believes that "the burden of proof of unreasonableness should rest strictly upon the government." The term "depreciation" should be abandoned in favor of the name "capital recovery allowance."

Now, if ever, is the time for restraint in pricing policy, warned Mr. Blackall. "The rule should be one of necessity rather than expediency." He urged the association to help the federal government maintain a price index of machine tools.

Production Challenge Seen

The best challenge to high prices today is more production per man-hour, said Mr. Pease in his presidential address. This means an investment in modern machine tools. Modern machine tools still are the best investment that money can buy.

What we need most, to parallel the energy and skill in design and production of present-day machine tools, declared Mr. Pease, is a rejuvenation in energy and skill of the machine tool salesman. "Never before have the eyes of factory management been so closely focused upon cost-reducing equipment."

Mr. Pease cautioned that it is dangerous to overestimate what the country will buy the coming year and "price our product on a lower cost based on a volume we do not get." He expressed doubt that many builders have raised prices to a

point where they are operating at a decent profit based on present costs on present volume.

"Our industry must not become a fringe industry," he stated, "where only people making some other product can afford the luxury of building machine tools. Every concern making something else besides machine tools should price machine tools so that they stand on their own feet with fair allocation of cost."

Sales Training Stressed

Better selling can be done by the industry by using better trained sales engineers, with better guidance by sales executives, said Herbert L. Tigges, executive vice president Baker Brothers, Inc., Toledo, Ohio, and chairman of the association's committee on sales and service.

He pointed out two criticisms made by dealers: lack of a factory-planned procedure for training of field salesmen who call at the factory for selling aids; and insufficient preparation by factory sales executives for meetings with dealers' salesmen at dealers' offices.

Greatest weakness of machine tool salesmen, asserted Mr. Tigges, is inability to look at the problem from the user's point of view. "The user is interested only in making a profit, not in engineering details as such."

Reporting on the Machine Tool Show, Swan E. Bergstrom, vice president Cincinnati Milling & Grinding Machines, Inc., Cincinnati, and chairman of the association's show committee, said that the show did more than display new machines to customers. It did the following:

1. Crystallized the thinking of future buyers regarding the importance of new machine tools in making their plant operations better and more profitable.

2. Drove home the fact that the best return on dollar investment is achieved in purchase of new machine tools.

3. Made clear that only by using new machine tools can management obtain a better product with less fatigue to the operator and at a lower cost.

4. Emphasized that with wages stabilized at a high level, machine tools must be used to make consumer goods with less manual effort.

The association's government relations committee will have as its major task, cooperation with the armed forces and the Munitions Board in developing plans to prevent the nation's being caught helpless so far as machine tools are concerned in another national emergency, said James Y. Scott, president Van Norman Co., Springfield, Mass., and committee chairman.

Of 126,000 surplus machines held by WAA, JANMAT will take 92,000, according to Mr. Scott. It is impossible to say how many of the remaining 34,000 to be disposed of as scrap or salvage are overage or damaged.

M. A. Hollengreen
(Director)

It is expected that all the JANMAT reserve will be shipped by next March 15, declared Mr. Scott, and that WAA will go out of the machine tool business on June 30, 1948.

Bureaucrats Not Convinced

Though a good job has been done of persuading prospective foreign users of their need for American machine tools, the industry has done a poor job of convincing the bureaucrats who hold the purse strings and allot the dollars, stated Alexander S. Keller, vice president Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., and chairman of the association's committee on foreign sales.

Non-technical government officials visualize the necessity for importing raw materials, food and fuel, commented Mr. Keller, "and the case for productive equipment falls by the wayside."

Foreign agents in European countries must persuade their governments and "we must persuade Congress and the administrative agencies that American machine tools are freely available (under the Marshall Plan) without damage to our economy, and that they must not be ignored as one of the important contributory factors to a sound European reconstruction plan," said Mr. Keller.

Loss of Orders Feared

Delays and actual loss of machine tool orders will result from WAA's extension of credits to foreign nations for purchases of surplus materials, including machine tools, he said. France got $50 million, Netherlands $25 million and Finland $5 million. But they probably will not be able to find what they want from the small remaining stocks.

Mr. Keller revealed that his committee has been working with the Export-Import Bank on a system of credit and transfer insurance for current transactions and for long-term commitments for special situations.

Latest inter-governmental credits are for Italy and Austria, said Mr. Keller. They are available for machine tool purchases, the exporter to receive payment in full. At present the bank is reverting to its earlier policy of supplying importer and exporter credits direct to American private industry, "which may require the exporter to carry some part of the commitment."

Mr. Keller minimized the immediate effects of proposed tariff reductions on machine tools coming into this country. He expressed the belief that foreign machine tool builders will continue to confine their competition to markets where "they can meet us on even terms."

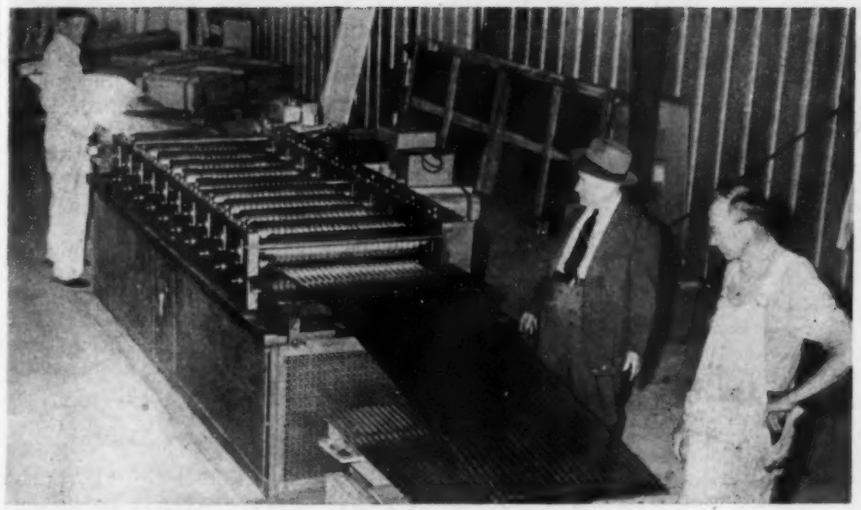
Today's new machine tools are at least one-third more productive on the average than their corresponding types built prior to or during the war, said Mr. Bryant, in assuming the presidency of the association.

At least one-third of our 1,750,000 machine tools are over 20 years old, he claimed. All of the balance, including machines installed during the war and until recent months, are more than 10 years old, or are of designs which are at least 10 years old.

A new sales drive is needed in the industry, said Tell Berna, general manager of the association, in his report. The industry also must carry out a dynamic public relations program. He said that the Treasury Department must adopt a wiser depreciation policy and machine tool customers must be wiser in taking advantage of depreciation opportunities.

Mr. Berna stressed the need for continuing the beneficial work on standardization. He said that a competent committee of the association is watching closely the development by General Motors of standards of its own for hydraulic actuating mechanisms in machine tools.

William L. Dolle, president Lodge & Shipley Co., Cincinnati, and chairman of the committee on public relations, made a special plea for association members to organize local speakers' bureaus and make themselves available to local clubs to tell the story of machine tools and of the private enterprise system. He described the need to reach teachers, members of women's clubs, professional people and others influential in the community and told how it is being done in Cincinnati.



Horizontal-Roll machine corrugates aluminum roofing sheets at rate of 60 a minute in any specified lengths at the Robbins Metals plant, Spokane, Wash. H. G. Robbins, president of the firm, designed the unit

Blast Furnace Out, 12 Foundries Close Due to Pig Iron Shortage

CLEVELAND—Shortage of pig iron was emphasized when 12 Cleveland foundries were forced to close down for the time it took to cool and repair a 600-ton-per-day blast furnace of American Steel & Wire.

Unable to accumulate sufficient inventory of pigs throughout the past summer and fall the foundries were working on a hand-to-mouth basis.

Spokesmen for the Gray Iron Founders Society pointed out that at least 35 other foundries were also affected by this blast furnace, some curtailing operations as much as 60%.

Meanwhile, the Northern Ohio chapter of the Institute of Scrap, Iron & Steel spearheaded a drive to speed the junking of wrecked and beyond repair automobiles from car graveyards to steelmakers and foundries as scrap. An estimated 1 million tons could be obtained from this source, backers of the campaign believe.

Both steelmakers and foundries are bitterly resisting price increases. One foundry, desperately in need of scrap, refused 2,000 tons at $58 per ton delivered. It was later commented that perhaps the foundry would welcome the seller before the current winter is over.

CIO Right-Wing Gains Strength

WASHINGTON—The shift to the right in the United Auto Workers, CIO, stacks the UAW-CIO and Philip Murray's Steel Workers against the Electrical Workers among the CIO's big three. It aligns 922,000 Steel and 920,000 Auto Workers against some 600,000 Electrical Workers.

This preponderance of power on the right will have its influence on many other CIO unions, giving aid, comfort and hope to the anti-communist elements seeking to drive communists from influence.

It will be long, if ever, before this trend makes any serious impression on two left-wing unions in the metal-working industries — the United Electrical, Radio and Machine Workers and the Mine, Mill and Smelter workers. The left-wing grip on these two outfits is tight and likely to remain so for considerable time. Even so, their influence in CIO strategy is on the wane.

NMTA Re-elects Howard Goodman

CHICAGO — The National Metal Trades Association at their recent convention here re-elected the following officers:

Howard Goodman, vice president, Goodman Mfg. Co., Chicago, president; T. J. Morton, Jr., president, Hoosier Cardinal Corp., Evansville, Ind., first vice president; and J. L. Kopf, president, Jabez Burns & Sons, Inc., New York City, 2nd vice president and treasurer.

Four new administrative councilors were elected: Joseph W. Crook, Grinnell Corp., Cranston, R. I.; Robert Hess, Washburn Co., Worcester, Mass.; Russell C. Ball, Philadelphia Gear Works, Inc., Philadelphia, and William L. Dolle, The Lodge & Shipley Co., Cincinnati.

Administrative councilors re-elected included: Howard A. Lincoln, Bemis & Call Co., Springfield, Mass.; H. Paul Nelligan, Easy Washing Machine Corp., Syracuse, N. Y.; R. A. Mitchell, Pittsburgh Forgings Co., Coraopolis, Pa.; Adrain Collins, Jarecki Mfg. Co., Erie, Pa.; J. I. Schultz, National Broach & Machine Co., Detroit; E. L. Usner, Ross Gear & Tool Co., Lafayette, Ind.; Harry Newcomb, Servel Inc., Evansville, Ind.; C. R. Rosborough, Moline Tool Co., Moline, Ill.; and M. E. Erskine, Racine Tool & Machine Co., Racine, Wis.

Standardization Seminar

NEW YORK—Dr. John Gaillard, mechanical engineer on the staff of the American Standards Association, will conduct a seminar Jan. 26-30 in the Engineering Societies Building on standardization. Registration may be made by writing Dr. Gaillard, 400 West 118th Street, N. Y. 27, N. Y.

Sections of huge steel cans being built by Goodyear Aircraft Corp., of Akron, Ohio, for the Navy's program of storing 2000 aircraft of all types in fly-away condition are sprayed by painters. Planes will be stored at six Navy bases through the country

Gaging Business

Labor Shortage Affects Output

Production in many segments of the metalworking industries is limited only by the volume of materials and the number of workers available.

Labor appears to be more of a problem than materials in some cities and in certain industries. There are shortages of both skilled and unskilled help here and there. Many manufacturers report extreme difficulty in getting men to take jobs on second shifts, even when premiums of 10c. an hour are paid.

Prospects Encouraging

The outlook is for metalworking operations to continue at the present high pace through the winter months. Moreover, the volume of new industrial construction points to further expansion of manufacturing facilities in metalworking as well as in other lines.

Prospective third-round wage demands are not looked upon as a forerunner of extensive strikes in metalworking. The belief is that agreements are likely to be reached without serious interruptions in the key industries.

Machine Tool Buying Expands

Machine tool sales are looking up. The amount of business being placed is mounting and seldom in peacetime have inquiries been so numerous.

Chief obstacle to orders being higher is the conservatism of top management in approving the machine tool purchasing programs agreed upon by their production executives.

Current sales are well distributed geographically and among user industries. Nevertheless, business is extremely spotty in the machine-tool building industry. Some companies have impressive backlogs, others have lean order-books.

Foreign Outlook Uncertain

Foreign business spurted upward in October and rough estimates indicate that it was good in November. This phase of the industry's sales is uncertain, however, because of the dollar shortage abroad. The Marshall program does not specifically earmark funds for machine tools, but the industry's feeling is that funds will be found somewhere by foreign nations for substantial purchases of American machines.

Machine Tool Outlook Bright

Machine tool business in first part of 1948 should be on a par with that which has prevailed during 1947, figured in numbers of units. Some important builders feel that the volume next year will be 15 to 20% better than this year.

Automobile manufacturers, farm implement and tractor makers and electrical goods companies will be lucrative sources of machine tool business in the coming months.

Proposed tariff changes, lowering rates on machines coming into this country, are not expected to affect seriously the business of American machine tool builders. Likewise, tariff reductions on U. S. machines going into certain foreign nations will mean little. The real barrier is not tariffs, but exchange restrictions and import license controls.

Tool and Die Sales Improving

Tool and die shops continue to show a slow upturn in business. Companies in the East reflect this improvement in particular. The emphasis is on specialty products more and more. Radio and electronic manufacturers are the most active customers.

Employment is about 10% under a year ago, but is holding steady at that level. Orders are good from the automotive industry, but no marked upsurge in bookings is anticipated from that source in the immediate future.

Steel Situation Grows Tighter

Steel sheet and strip shortages continue to grow worse as far as the stamping trade goes. Little hope is held of any relief in the situation until late in 1948 or early 1949.

The industry continues to overrule any thought of additional expansion, pointing out the amount of steel necessary to increase installations would have to come out of the steel flowing into manufacturing channels.

However, rumors persist that an expansion program of major proportions will be announced before too long. Jones & Loughlin's plan to increase production by 150,000 ingot tons by the end of 1948 may be a tip of things to come.

Pig Iron Inventories Low

Foundries are feeling the pinch of pig iron shortages. Twelve Cleveland foundries were forced to shut down when a single blast furnace was shut off for repairs.

This is the result of the inability of these foundries to build up any kind of inventory. A drive is underway now to roundup all available scrap from junked autos and other sources in a move to produce more pig.

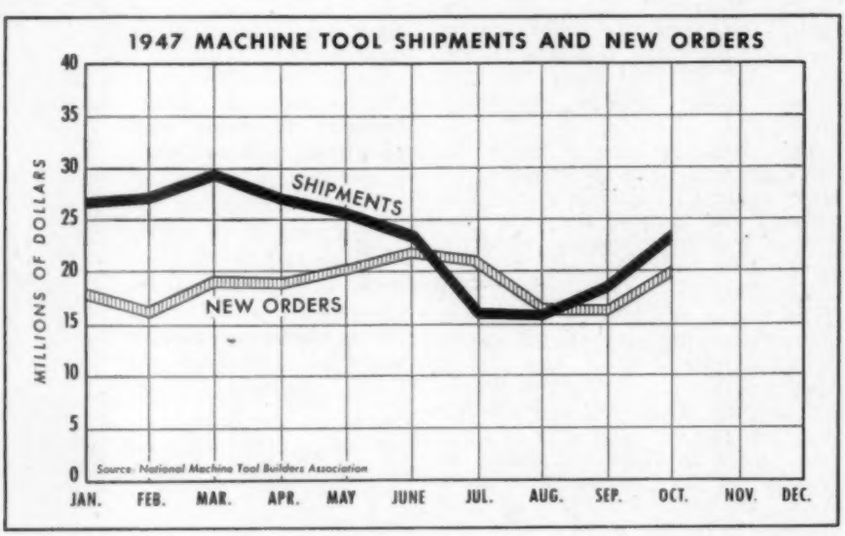
1947 Machine Tool Production
(Thousands of Dollars)

Month	Shipments	New Orders	Unfilled Orders
Oct. 1946	$25,517	$22,664	$175,984
1947			
Jan.	26,542	18,991	154,760
Feb.	26,765	16,780	146,145
Mar.	29,012	19,509	137,175
Apr.	26,857	18,220	128,830
May	25,791	20,018	121,155
June	24,383	23,810	120,288
July	18,843	22,227	124,155
Aug.	16,348	16,007	122,097
Sept.	19,833	16,294	118,109
Oct.	24,513p	20,917p	113,674p
Total (9 mos.)	$236,887	$192,873	

p-preliminary

Note: Foreign portion of unfilled orders is 27% of total.

Source: National Machine Tool Builders Association.



Steel Plentiful In Gray Market Around Chicago

CHICAGO—The steel supply situation among Chicago area metalworking firms is the gravest since the end of the war. The gray market in steel is thriving, with some firms paying three times list prices for scarce sheet, and carloads of metal are available to those who agree to pay fantastic premiums.

The most depressing aspect of the current situation, from the point of view of plant executives is that they expect at least a year to elapse before a significant improvement in the steel supply is noted. And some metalworking men say that the program of European aid may put off the day of adequate supplies even longer.

Many of the smaller manufacturers insist that steel companies themselves are to blame for at least part of the gray market. They assert that numerous companies that flourished in wartime, but have since dwindled, are still receiving large quantities of steel from the mills and are in turn selling this steel at premium prices. The general belief is that steel makers have not been careful enough in policing their customers.

One small metalworking firm in Chicago today has a full time official who does nothing but travel around the country buying up steel. He obtains far more than the firm needs, and the balance is sold at a profit to other manufacturers. The company is doing the same thing with electric motors.

Still other small firms declare that their situation has been aggravated by the sale of steel mills to automobile manufacturers. One Chicago firm says it has had two steel suppliers "sold out from under" it.

Almost half of the Chicago metalworking firms that buy directly from steel mills say that their quotas have been cut—as much as 50% in some instances—in the last three months. Another 30%, queried by the local purchasing agents group, said that they had managed to maintain their position. Only 20% reported any improvement in supplies.

Three out of every four of the companies surveyed said that their output was directly related to the amount of steel they received. Nevertheless, most metalworking firms in Chicago report that production is fairly good and that employment is at record high levels.

Explaining to some extent the continual good production record in the face of steel shortages is the fact that inventories of many companies are declining.

Orrin B. Werntz

Trade Executives Elect O. B. Werntz

VIRGINIA BEACH—The American Trade Association Executives comprised of approximaely 1200 members met here for their annual convention Nov. 9 to 12, and elected Orrin B. Werntz of Cleveland as one of 8 men to serve a 3-year term on the board of directors.

Mr. Werntz was discussion leader of a round table which included John H. Moninger of the American Meat Institute, Clinton S. Darling of the National Automatic Merchandising Association, and Frank L. Jeckell of Dominion Brewers Association of Canada.

Mr. Werntz is executive secretary and counsel for the National Screw Machine Products Association and was president of the Cleveland Chapter of Trade Association Executives for the term ending June, 1947. He is also chairman of the Public Relations Committee of the National Industrial Council which is the trade association division of the National Association of Manufacturers.

Tucker Production Date Advanced to March, 1948

CHICAGO—A year ago The Tucker Corp. expected to be in production with the firm's new automobile by March, 1947. Today the tentative production date has been advanced by just one year—to March, 1948. Thus far, the company has only built one complete car, a hand-made job, and a few chassis.

Meanwhile, the company is going ahead with its plans, getting the giant Dodge-Chicago war plant, recent site of the Machine Tool Show, in shape, and claims to have guaranteed supplies of steel and other essentials on the way.

Over-Expansion Of Non-Ferrous Foundries Felt

CLEVELAND—Too much capacity, built to its present level during war times, is given as the principal reason today for the disorganized and unstable conditions prevailing in the non-ferrous foundry industry.

Conditions in the Cleveland area in the industry are a fair sample of what is happening throughout the rest of the U. S.

The present death rate among small shops which were put together and operated through the war years and with little capital behind them is at the rate of 1 to 3 per week. Those that are left behind are sufficient in number to completely upset the price structure which the larger and better established members of the industry are trying to maintain.

Contracts are being closed by any number of the smaller shops at figures which will not permit day wages for the owners. Such contracts are being filled by the shop owners with the hope of staving off closing their shops. Purchasing agents, knowing of the present disorganized conditions, are taking full advantage of the situation and holding the price quoted by the desperate shop owner over the head of the larger companies and thus forcing them to recede from their published price lists.

The weakness in the price structure is not applicable to aluminum alone, bronze is in the same boat.

Non-ferrous foundries who were able to get started and well under way in permanent mold work by war's end are the exception to the present conditions.

Nationwide figures prove the wisdom of this shop's officials in turning to permanent mold work since they show present production of 11 million pounds of permanent mold castings are being turned out per month now as compared to an average 10 million pounds per month in the latter months of the war.

Non-Basic Steel Group Ends Active Operations

WASHINGTON — The Non-Basic Steel Coordinating Committee, organized two years ago to protect non-basic steel companies having agreements with the CIO Steel Workers from union demands for industrywide bargaining, has ceased operations. The charter is being kept alive, however, in the event of a need for renewed activity. Records are being left with the general counsel, Miles H. Knowles, in Washington.

Unequal Allocations, Gray Market Behind Steel Shortage, Group Told

CLEVELAND — Diversion of sheet steel to "gray markets" and unequal allocations of sheet steel by steel mills between owned stamping companies and independent ones are two reasons why the stamping industry cannot secure adequate supplies, Tom J. Smith, Jr., president of the Pressed Metal Institute charged Nov. 24.

Speaking before an audience of more than 500 members of the Institute and their guests, Mr. Smith added the following reasons for the shortage of strip metal:

1. Shortage of scrap.
2. Refusal of certain steel producers to ship direct to small users and to accept orders for hot-rolled steel as in the past.
3. Refusal of certain steel mills to accept and fill orders from old customers located at considerable distance from the mill and refusal to recognize historical position of stamper with companies absorbed by the steel mill.
4. Lack of sufficient ingot pickling and hot-rolling mill capacity.

Higher Costs Result

This shortage of steel strip and sheet has resulted in higher costs of stampings and end products using stampings due to increased shop costs, Mr. Smith pointed out, because:

1. Greater downtime of presses.
2. More frequent and increased cost of tool settings.
3. Greater quantity of spoiled work.
4. Disproportionate time of management required to find enough steel to keep operating.

The Institute has been actively campaigning since 1946 to correct the situations outlined and Mr. Smith projected 11 steps the organization is backing to this end.

Charles M. White, president of Republic Steel Corp., speaking on the same program with Mr. Smith, predicted that 1948 would be a repetition of 1947 as far as the steel picture is concerned. He cited a survey his company made recently which showed the steel demand for the 12 months starting Sept. 1, 1947, to be 66.5 million tons of finished steel.

Next year's production, according to Mr. White, cannot greatly exceed this year's 62 million tons, leaving industry 3 to 4 million tons short of requirements. He refuted many charges levelled against the steel industry.

No Mystery Seen

"There is no mystery about the cause of the present steel shortage and the stamping industry is no different than the automobile, agriculture implement makers and all other steel concerns in their need for more steel," he asserted. "It is physically impossible for the steel industry to produce more tonnage to build, equip and provide an inventory of steel for countless new plants at the same time satisfy current demands for steel, based on the highest national income in our history. I am reasonably certain that our output will not be increased by passing resolutions or restrictive laws."

Mr. White decried charges that have been made that the steel industry is in a program of planned scarcity and pointed out the industry has spent more than a billion dollars and Republic Steel has made commitments for more than $108 million for plant improvements.

Shortages of labor, ore, coal and scrap were pointed out as stones in the path of immediate expansion.

One-Piece bus and truck bumpers are formed by the Cyril Bath Co., Cleveland, from high-alloy aluminum extrusions on Bath Universal contour forming machines

Union Loses Fight

WASHINGTON—In a unanimous decision The National Labor Relations Board has upheld dismissal by the Copperweld Steel Co. of the local union president and five other members of the CIO Steel Workers for instigating a strike last year in violation of a no-strike agreement covering the company's plant in Warren, Ohio.

Changes in Tax Policies Urged To Aid Industry

WASHINGTON—Tax policies which will encourage risk-taking investment are essential if the United States is to avoid economic degeneration which has overtaken such countries as England and France, George Terborgh, research director of the Machinery and Allied Products Institute, warned in testimony before the House Committee on Ways and Means, Nov. 24.

Since the 1920's American capital in the form of industrial equipment, housing and public works has been consumed faster than it has been replaced, he said. Present tax policies, he added, leave an inadequate supply of savings for necessary investment.

Mr. Terborgh, speaking for the capital goods industries represented by the Institute recommended:

1. Reduce the corporate tax rate as rapidly as possible to not over 25% and make it a flat-rate levy, without graduation or exemptions; and moderate the progression rate on individual incomes so that no portion of personal income is taxed more than 50%.
2. Abolish double taxation of dividends.
3. Provide for a six-year carry-over and three-year carry-back of losses.
4. Liberalize depreciation policy, and place the burden of proof on the Treasury Department in cases of disagreement between the taxpayer and the government.
5. Reduce the capital gains tax and allow full deduction for losses.
6. Modify present provisions relating to undue accumulation of corporate surplus.

Non-Production Bonuses

WASHINGTON — Forty-eight per cent of more than 6,600 metalworking establishments surveyed by the Bureau of Labor Statistics paid non-production bonuses to their plant workers; 52% paid them to office workers. This record is considerably better than the average for all manufacturing plants surveyed.

Detroit

REUTHER VICTORY SEEN COMPLICATING BARGAINING PROBLEMS IN AUTO FIELD... SHIFT TO POLARIZED LIGHTING IS OPPOSED

Automobile industry officials are looking ahead with high interest, and no small amount of apprehension, too, at the effect of the crushing victory of the Walter Reuther forces in the recent convention of the United Auto Workers Union, CIO. Best belief is that the passing of control into a unified international board will complicate the bargaining problems of the auto firms.

The Reuther philosophies of broad scale price reductions, profit reductions, uniform wages in all shops, industrywide bargaining and consultations, and others, are expected to bob up in all sorts of negotiations. Hitherto they were confined to the General Motors sphere, only area in which Reuther held unchallenged control of negotiations.

Wage Demands Expected

There is little doubt but that Reuther will press for wage increases when most contracts open up on that issue. The big agreements arrive at open wage ends in the spring. The only alternative possibility to wage demands is that price structures break down quite considerably before that time.

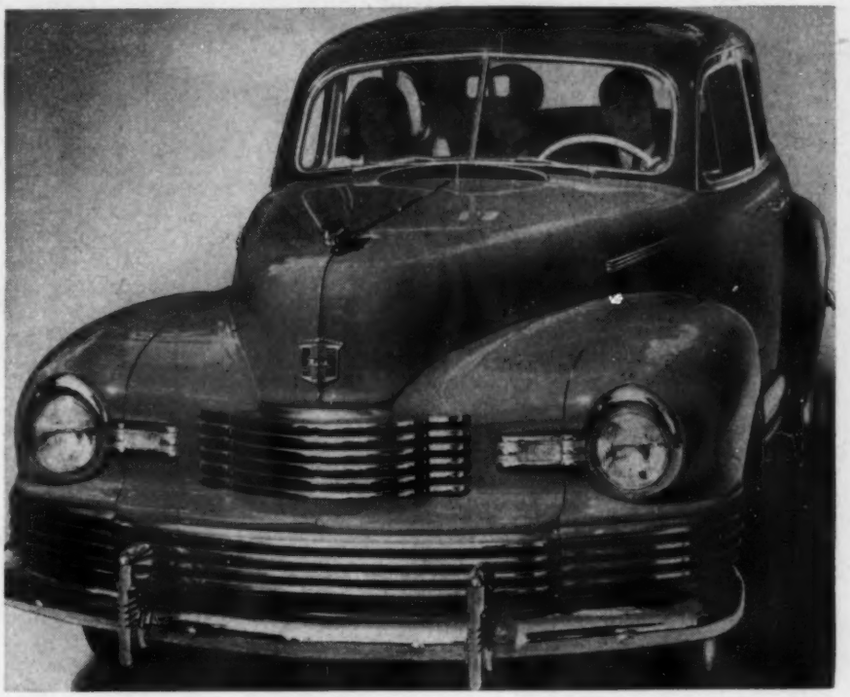
Even if prices fail to advance further, Reuther is likely to call for higher pay. The reason is that the Reutherites at the Atlantic City convention were vehement in their viewpoint that they had been handed responsibility by the delegates, and it is now up to them to prove they can deliver a better deal for the workers. That political pressure being what it is, a variety of demands appears positive.

Beyond that, the remnants of the union's left wing still are solidly entrenched at a number of local points. After all, the anti-Reuther vote at the convention did represent around 25% to 30% of the total. There will be fierce struggles for controls at these locals between a desperate left wing and a confident Reuther faction intent on consolidating its position beyond any hope of upset. Companies whose shops sent anti-Reuther or split contingents to the convention can well view the future with worry.

Skilled Tradesmen Discussed

The problem of skilled tradesmen and upgraders received floor attention at the meeting. The craftsmen want the upgraders to return to their pre-war production jobs. The upgraders, on the other hand, say that they are entitled to any jobs they are qualified to hold, that the wartime agreement on upgraders (which provided their return to production jobs whenever journeymen became available to replace them) should now be abandoned. The upgraders have numbers on their side.

The thorniness of the problem was well indicated in convention action. The issue came to the floor in the form of a resolution to refer the matter to a committee. This was vigorously debated, although finally passed. One speaker urged that, "we settle this thing now and for all—even if we have to stay on it for the next twelve hours." What the committee will do is anyone's guess. But there is some belief that if it rules against the journeymen, they might "take a walk" out of the union.



Massive Front-End Treatment characterize 1948 Nash cars and new body styling touches provide smooth-flowing lines for a longer lower appearance

Aluminum Pushed

Aluminum is coming more into the auto production picture. At the recent American Society of Body Engineers convention, a Ford official bespoke the need of designers' considering the material for various car uses. It is known that one of the other manufacturers, also a large one, contemplates the use of aluminum in a number of new places on forthcoming 1948 models.

Already aluminum is being used in such diverse applications as gasoline tanks (by Kaiser-Frazer), running boards and headlamp shells (Ford), heater manifolds (Packard), minor support posts (Chevrolet), and others. It might be noted, too, that aluminum is scheduled to replace steel in 1948 refrigerators by Kelvinator.

There has been no change of note in the tool and tooling picture in Detroit. Activity in the shops continues about constant, with windups of some of the smaller earlier programs seemingly balanced by placements of some Chrysler Corp. work.

On this score it might be noted that the monthly reports out of the Michigan Department of Labor show the "machine tools and accessories" group of employers to be the highest paying of any of the 24 industrial classifications. The 54 shops and companies reporting in this classification had an average weekly paycheck of $68.61 during September, last month of tabulation (and not changed significantly since), based on 41.2 hours of work at an average of $1.665 an hour. Only engine and turbine makers had a higher hourly rate ($1.732) but their hours of work averaged lower.

Sealed Beams Win Out

The auto industry's engineering liaison committee unveiled two years of nearly secret work on polarized lighting for automobile headlamps during November, only to announce laconically that the recommendation was against any shift from sealed beam lamps at this time.

U. S. Gains Tariff Cuts on Machines

WASHINGTON — Ranking high among the achievements of the United States delegation at the Geneva Tariff and Trade Conference were numerous concessions obtained on industrial machinery, machine tools, agricultural equipment, electrical and office machinery and appliances.

The agreements will become effective, provisionally, Jan. 1, 1948, in Australia, The Belgium-Netherlands-Luxemburg Customs Union, Canada, France, The United Kingdom, and the United States. Other participating countries will put their agreements into effect as soon as their constitutions or law permit, which must be accomplished by June 30, 1948, at the latest. The United States and 22 other countries participated in the general agreement.

Concessions obtained by the United States, of interest to the industrial machinery, machine tool, and general capital goods manufacturers, follow.

Industrial Machinery

United Kingdom—Bound the tariff rates on machine tools at 20% ad valorem and reduced portable pneumatic tools from 20 to 15%. Other items reduced from 20 to 15% include: excavating, lifting and rolling mill machinery and air and gas compressors and exhausters. The duty on stationary internal combustion engines was reduced slightly and most textile machinery was either bound at 20% or reduced to 15%. Duties on certain printing presses were reduced to 15%, on can casing machines by 25%.

Canada — Reduced the duty on boilers from 25 to 20%. Ore crushers and certain other mining machinery was reduced from 17½ to 15%. Locomotives and railway motor cars for mining, metallurgical and forest industries, when of a class not made in Canada, were bound free. Machinery "not otherwise provided for" was bound at 10% in the case of items of a kind not made in Canada, and at 25% if made in Canada.

France — Concessions granted on machine tools and machinery for the most part returned the duty rates to 1936-38 levels, which were about half of the minimum tariff rate just before this new agreement. Under the new agreement the following rates apply: semi- and automatic lathes were cut from 25 to 12½% ad valorem. Machines for grinding, polishing, lapping, dressing and surface planing, working by means of grindstones and abrasions and polishing products, with micrometric setting system, from 25 to 13½%. Embossing, drifting or broaching machines, from 25 to 12½%. Boring, milling, threading, planing, sliding lathes, vertical lathes, other machine tools working by removal of metal, from 25 to a range of 6, 14, 18%. Gear cutting machines from 25 to 10%. Small portable electric tools, with or without motors, from 25 to 10%. Metal grinders without micrometric setters, from 25 to 10%. Tractors, caterpillar and wheel, from 70 to 15-35% ad valorem per weight factor.

Australia — Eliminated the duty and preference on monoline composing machines, reduced the duty on linotype, monotype and type composing machines from 30 to 15%. Drilling, milling, planing and shaping machines, lathes, portable pneumatic hand tools were cut from 19 to 15%.

India—Bound 10% duties on numerous types of machinery for mining, oil crushing and refining, refrigerating, well drilling, shoe manufacturing, sugar manufacturing and refining and metal working (except machine tools) machines and their parts.

Burma—Bound a 10% duty on most mining machinery, oil crushing and refining machinery and machine pumps, and reduced duties on refrigerating machinery and hand pumps.

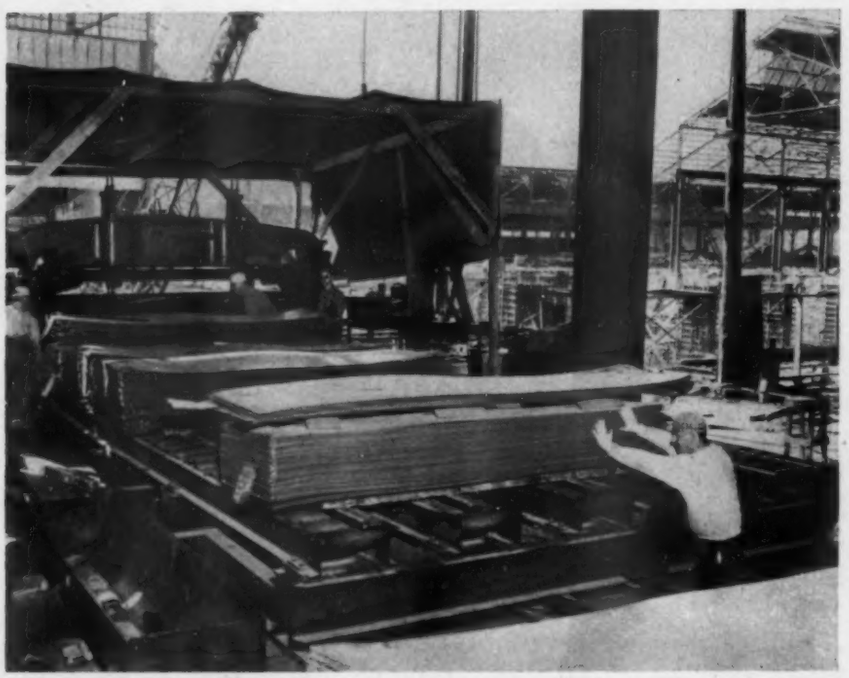
Newfoundland — Eliminated entirely duties on machinery for processing fishery products, bound present duties on hand and power machinery, heating equipment, wood working and saw mill machinery. The duty on mining machinery and paper and pulp-making machinery was bound free. The British margin of preference was eliminated on certain types of machinery used by fish packers.

Ceylon — Reduced the duty on cranes and hoists, and pumping machinery.

Southern Rhodesia — Bound the present duties of 5% on certain types of mining machinery, pumps and accessories, and machine tools.

New Zealand — Conceded reductions from 30.625 to 15% on machinery for boring and well drilling. Reductions were made on duties for machine tools from 30.625 to 20%. Sewing machines were bound at 3%.

Union of South Africa—Lowered the preference and reduced the duty on industrial machinery. The margin of preference on cranes, excavators, winches, etc., was eliminated, and the duty bound. Machinery for factory installation, agricultural machinery, stone crushers, road rollers, road construction and street sweeping and spraying were bound on the free list. Air conditioning and mining machinery was bound at the present rate of duty of 5%.



Production of Steel Sheets continues at Columbia Steel's old mill at Pittsburgh, Calif., while construction of new $25-million sheet steel and tinplate mill goes ahead over and around the work lines. New equipment will replace the old as the last move

Benelus (Belgium - Netherlands - Luxemburg)—bound machine tools at 6% and agreed to maintain a moderate rate on numerous kinds of machinery and appliances, including certain pumps, prime movers, hydraulic and other presses, and lifting, hoisting and road-building machinery.

Czechoslovakia — Lathes, planing, shaping and milling machines, over 1,000 kilograms, bound at 1,000 crowns per 100 kilograms.

Norway—Assured the maintenance of duty free treatment on typesetting machines, linotypes, printing presses and certain pneumatic tools.

Lebanon—Reduced the duty on industrial sewing machines and machine tools by 87%.

Cuba — Substantially lowered duties on railway passenger coaches and accessories for pumps and boilers. A binding of existing rates was obtained on sugar machinery and sewing machines.

Brazil—Agreed to hold the duty below 10% on power pumps, steam boilers, air compressors, power excavators and dredges, pneumatic tools, certain power cranes and hoists, internal combustion engines, road building machinery, linotypes and other typographical machines, air-conditioning machinery, grinding mills, heavy industrial presses, sawing machines, large power vises and lathes, industrial fans, dust extractors, and other specified industrial machines. Duties on gasoline pumps and certain other machinery were held to less than 20%.

Chile—Reduced the duty by 30% on machine saws. Duty on warehouse trucks was reduced from 0.15 gold pesos per gross kilo to 0.05 peso per net kilo. Cars for portable railroads and ferry cables were reduced 50%. Bindings of moderate duty rates were obtained on mining machinery, pumps, cranes, winches, tackle, pulleys, blocks, certain industrial machinery, spare parts for road machinery, polishing disks, drills, internal combustion engines, wheels, axles and rims weighing over 50 net kilograms and parts for railroad machinery.

China—Bound a 7½% rate on machine tools, and a 10% rate on pumps, industrial refrigeration machinery, and a long list of miscellaneous heavy machines. A 25 percent reduction was obtained on gas, oil and steam engines, and on steam and hydraulic turbines. Duty on sewing machines was bound.

Agricultural Machinery, Tractors

The United Kingdom — Bound a 15% rate on tractors, eliminating the preference. Track laying tractors were reduced by 25% and 40% depending on horsepower.

Canada — Bound free most farm implements and machinery.

Sweep Guard on riveting machine pushes fingers away automatically when plunger comes down on rivet. The safety device, invented by John Mulligan of Emerson Radio & Phonograph Corp., operates in conjunction with the foot pedal

South Africa—Reduced the duty and preference on farm tractors from 10% to 5%.

Burma — Bound various types of agricultural implements on the free list.

Czechoslovakia — Bound existing duty on light tractors.

France—Granted a concession on tractors.

Australia — Bound the duty and preference on certain tractors at 10% and on others at 12½%.

India—Bound plows and parts and agricultural tractors, and parts, on the free list.

Norway—Bound moderate rates on agricultural machinery and on tractors and parts.

Brazil — Bound agricultural machinery and tools on the free list.

Chile—Cut the duty on tractors and parts by about 65%, and bound moderate rates on agricultural machinery and parts.

Lebanon — Granted a 60% duty reduction on tractors, bound duties on tractor parts, bound agricultural machinery on the free list (provisionally) and bound parts at a moderate level.

Newfoundland—Bound duty free treatment on tractors.

Ceylon—Reduced duties on agricultural machinery.

Southern Rhodesia—Bound a 5% rate on certain types of agricultural machinery tractors and parts. Duty on plows and parts (15%) was also bound..

New Zealand—Granted duty reductions on tractors and tractor engines, and bound a 3% rate on most farm machinery, including binders, reapers, mowers and parts.

Larson WAA Associate

WASHINGTON — Jess Larson, Chickasha, Okla., attorney, has been appointed by President Truman as associate administrator of the War Assets Administration.

Air Reduction Opens New Lab

MURRAY HILL, N. J.—Reflecting the growing trend toward decentralization and the location of research facilities away from the smoke and squalor of industrial areas, a new apparatus research laboratory has been erected by Air Reduction Sales Co., at Murray Hill, N. J. Completely modern in every respect, the plant has 78,000 sq. ft. of floor space, plus an acetylene generator house and a combination boiler room and garage, and is devoted to the development of apparatus, machinery and processes for fabrication, heat treatment and refining of metals.

The building is of the modular unit type so that any office or group of offices may be converted into laboratories by the removal of the steel partitions. Service lines for high and low pressure oxygen, acetylene, city gas, nitrogen, compressed air, water and electric power pass through the floors and are arranged for tapping at suitable locations.

Although not intended for production work, the plant includes a completely equipped machine shop and a large, high-ceilinged assembly area for the manufacture of special machinery and apparatus, and for the construction of prototype production equipment. Also provided is a specially ventilated flame-proof area for experimental work on the combustion of gases and processing of metals.

Laboratories are equipped with every modern device for X-ray, chemical, metallographic and mechanical testing, and include a microhardness tester designed and built by company engineers. Specially equipped laboratories are provided for high pressure oxygen research and compressed gas cylinder testing.

Proposal for Allocation of Steel Tonnage Puts Industry in Turmoil

PITTSBURGH — Notwithstanding a disbelief that President Truman's program of economic control will prevail, both the steel industry and its customers are likely to remain in a turmoil for several weeks over the outcome of the proposal for allocation of tonnage.

Thus far, allocation, as a subject in itself, is engulfed in the general proposals for implementation of the Marshall Plan as proposed by the Administration. Thus, the big guns against allocation of steel have yet to be trained in the direction of Washington, and it may be expected that when they are fired, the reverberations will be heard over considerable distances.

The steel industry, it will be developed, is willing to set aside a tonnage of steel for shipment to Europe, but it wishes to keep control of the remainder. Furthermore, it wishes to retain the right to determine its own price policies.

Overhauling Spread Out

The long-term program for overhauling of over-worked steel industry facilities, including blast furnaces, got underway at the start of November and will continue for a minimum period of 1½ years.

The industry, however, has become so adept at manipulating its equipment that only a modest tonnage of steel will be lost during any particular phase of the repair period. Another factor minimizing the loss thus far in the month of November has been an ability of some companies to have all their furnaces operating at a time when some other companies have had to curtail to some extent.

The net result is that both ingot production and finished steel shipments in November were better than anticipated.

One company in the Pittsburgh area, starting a program of having one blast furnace off constantly during an 18-month period, said it will lose approximately 5% of its steel output. This same company, on the other hand, will make a complete overhaul of a tandem strip mill without any loss of production by staggering the work over a three-year period.

Expansion Moves Awaited

There is a continued belief in the steel industry that a major expansion program will be announced shortly, probably before the close of the year.

This will be in addition to the 2½ million tons of ingot capacity which the companies said late in the summer it would construct to assist in meeting the extreme shortage of metal.

It is expected this will be done to accomplish two objectives—still the insistent clamor in numerous official and labor circles that capacity is inadequate and advance the proposals in order to meet some of the extreme requirements of the Marshall plan.

Steel companies show a strong disinclination to give their attitude in respect to a five-year accelerated amortization program in respect to any new facilities which may be erected under such an arrangement.

The steel industry, it may be summed up, is against seeking any favors from the government, but if accelerated amortization were to be offered to the steel companies, it is difficult to see how it could be refused. It would depend upon any strings attached.

Mobilization Shaping Up

There is no longer any question that an industrial mobilization program is shaping up rapidly in the Pittsburgh Ordance district.

One company has completed its program here, probably the first in the nation among sizeable corporations.

It will review this plan of preparedness once each year, and make such changes as are necessary.

The nub of the plan is that there will be quick availability of the total tonnages of materials required to produce ordnance items and the volume of ordnance which can be produced in available plant with available machinery, plus a program of additions to facilities should such be ordered by the government.

Carryovers Certain

Shipments by steel companies against uncompleted orders of customers cannot be filled by the end of 1947 notwithstanding that back orders are being given preference over fourth quarter quotas. The result is that there will be additional carryovers into 1948 and current guessing is that the cleanup will not come until February.

This means that some customers of steel producers—particularly light flat-rolled—are going to get short shipments in December and January.

All quotas in 1948 are going to be subject to quick change in event of directives being applied in respect to European shipments.

There is little indication on of any easing in demand for flat rolled-steel items for months.

Open House attracted more than 4000 persons at the Norton Co., Worcester, Mass. The show was sponsored by the Machine Division and included the booth from the recent Machine Tool Show at Chicago

Open House Held By Norton Group

WORCESTER, MASS.—More than 4000 employees, their families, townspeople and friends visited the first Machine Division open house at Norton Co., Nov. 6-7.

An extensive tour of the division culminated in inspection of the company's booth from the recent Machine Tool Show, with all 12 machines of the original booth operating.

There were also, directly across from the display, machines of the Norton bottle-labeling line in process of assembly and several current subcontract jobs, including lens generators, paper box machinery and a vari-speed drive.

Announcement of the open house made in a special edition of "The Norton Spirit," house organ, which contained a diagram of the tour and explanations of the exhibits as well as photos of the Machine Tool Show from the American Machinist Show Report, Oct. 9.

Names in the News

Walter G. Tucker

Paul C. Pocock

Walter G. Tucker was elected chairman of the board of Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, to fill the vacancy caused by the resignation of **H. A. Toulmin, Jr.**, as board chairman and general manager. **Paul C. Pocock,** formerly vice president in charge of sales, will assume active direction of the company's operations as executive vice president and general manager. **Warren R. Tucker** was elected to fill the newly created post of vice president in charge of engineering research

S. H. Egbert has been appointed production manager of McCulloch Motors Corp., Los Angeles.

Granville M. Parker has been named treasurer of the Fenn Mfg. Co., Hartford, Conn.

Peter F. Hurst, executive vice president of Aeroquip Corp., has been elected president and director of Eltron, Inc., of Jackson, Mich.

C. O. Miller, director of purchasing and salvage section of the manufacturing staff, has assumed a new position to handle special assignments for General Motors. **H. L. Dingler,** former director of the company's industrial engineering section, succeeds Mr. Miller. **Paul A. Switzer** has been named to the post formerly held by Mr. Dingler.

Edward E. Lewis has been elected president of Colonial Radio Corp., Buffalo, N. Y.

Stanley H. Ellison has been appointed executive assistant in charge of Carrier Corp.'s new plant in Syracuse, N. Y.

Joseph B. Overman, chief of planning for the treasury department of Willys-Overland Motors, has been appointed assistant to the treasurer to fill the position which **A. E. Barton** resigned from. **R. R. Hessler** will succeed Mr. Overman as chief of planning.

R. B. Moir has been appointed vice president in charge of engineering and product development of Foote Bros. Gear & Machine Corp. in the Industrial Gear Division. **B. H. Quackenbush** will be sales manager.

Milton S. Sarran has been named manager of sales for the warehouse division of Atlantic Steel Co.

Harry A. Wright has been made engineer in charge of sales of the control section of Allis-Chalmers electrical department.

T. Norman Willcox has been appointed manager of the Methods and Equipment Laboratory of the Plastics Division, General Electric Chemical Department.

Earl R. Nelson has been appointed manager of the Cincinnati plant of Joseph T. Ryerson & Son, Inc. He succeeds **Wayne D. Dukette** who will head the company's new steel-service plant in San Francisco which is now under construction.

Minor T. Dow, former sales training engineer with Airtemp division, Chrysler Motor Corp., has been named vice president in charge of sales for Manufacturers Development Corp., Dayton, Ohio. **J. J. Smiley** has been named vice president in charge of manufacturing and **E. J. Faulkner,** formerly with Dayton Pump Mfg. Co. will be project engineer.

Forest J. Smith has been appointed supervisor of labor relations of Carnegie-Illinois Steel Corp., with headquarters in Pittsburgh, succeeding **A. H. Wardwell** who has resigned to become director of raw materials of American Steel & Wire Co.

Frank R. O'Donnell has been named manager of the Champion Forge Co., which recently acquired the assets of the Champion Machine & Forge Co., Cleveland. **Lester L. Reuse** has been placed in charge of sales, and the following have been named sales representatives: **C. A. Carr,** Detroit; Homeier & Co., Akron; Oliver Metals Inc., Cleveland and western Pennsylvania; Stanley-Dierdorf Inc., New York and eastern United States.

Howard J. Scaife has been appointed manager of market development and **William F. Ogden** manager of product planning of Hotpoint, Inc., Chicago.

A. S. Terry, Grand Haven, Mich., has been named sales manager of air motors and controlled air devices by the Bellows Co., Akron, Ohio.

Chris A. Wiepking

Chris A. Wiepking has been named chief engineer of the Delta Mfg. Division, Rockwell Mfg. Co., Milwaukee.

H. R. McKean has been appointed general superintendent, **J. B. Dunn** production manager, **F. F. Brand** manager of engineering and **H. F. McRell** manager of sales for General Electric's transformer and allied product division.

F. H. Craton has been named manager of sales by General Electric's Locomotive and Car Equipment Divisions of the Apparatus Department, Erie, Pa. Other appointments include: **H. W. Gouldthorpe,** manager of engineering; **David Blair,** production manager; **H. O. Trumpfheller,** assistant to manager, manufacturing.

Richard S. Huxtable

Richard S. Huxtable has been named vice president and general manager of the Fawick Airflex Co., Inc., Cleveland.

David N. Burruss, Jr.

David N. Burruss, Jr., has been appointed director of engineering for the Glidden Co., Cleveland.

MEETINGS

Materials Handling Exposition. Public Auditorium, Cleveland. Jan. 12-16. Clapp & Poliak, 350 Fifth Ave., New York.

Pressed Metal Institute. Annual meeting. Hotel Statler, Buffalo, N. Y. Feb. 10-11. Sam Morrison, vice president, Morrison Steel Products, Inc., Buffalo, chairman.

Society of Automotive Engineers. Annual meeting. Book-Cadillac Hotel, Detroit. Jan. 12-16, 1948. John A. C. Warner, secretary and general manager, 29 West 39 St., New York.

BUSINESS ITEMS

Airadio Inc., Stamford, Conn., announced recently a change in ownership and management. Jay Sullivan, former vice president and general manager, was elected president and treasurer after buying J. B. Cobrain's interest in the concern.

Wadsworth Equipment Co., formerly the Wadsworth Core Machine & Equipment Co., has completed a reorganization program which included the change in name and the announcement by Pres. E. A. Allan of an expansion program.

Allegheny Ludlum Steel Corp. has placed an order for a $3½-million slabbing mill for its Brackenridge plant with the Morgan Engineering Co., Alliance, Ohio. Delivery is planned late in 1948.

Colorado Fuel & Iron Corp., Denver, Col., has approved an expansion program of $7 million. Included in these plans is the replacement of obsolete fine wire manufacturing equipment in their plant at Falmer, Mass.

Frank A. DeWitt has been appointed director of research for Justowriter Corp., Rochester, N. Y. The post is newly created.

Paterson S. Weaver has been named assistant to general superintendent of the South Chicago Works, Carnegie-Illinois Steel Corp. **Kenneth J. Mortimer** has been made superintendent of the plant's production planning department succeeding Mr. Weaver.

Robert C. Graves, Federal Electric Products Co., Newark, N. Y., has been named vice president in charge of sales.

Robert C. Graves

Sperry Products, Inc., Hoboken, N. J., has announced a $1-million contract for a factory in Danbury, Conn. The Hoboken plant will move into the new building in 1948 and the Weehawken operations will be shifted to Danbury factory at a later date.

Screen Equipment Co., Inc., Buffalo, N. Y., has placed in operation its new plant. The company plans to double its production with the new plant.

Bell Aircraft Corp.'s Burlington, Vt., plant will be transferred to the company's Niagara Falls plant when the Vermont property is sold to the General Electric Co. with WAA authorization.

Yale & Towne Mfg. Co. has announced the completion of its new Yale Material Handling Machinery Building at 205 East 43rd St., New York City, for the Philadelphia Division. Sales engineers have been moved from their offices in the Chrysler Building and a "garage" and showrooms to repair, service and display equipment is being installed.

Studebaker Corp.'s purchase of the government-owned aircraft engines manufacturing plant in South Bend, Ind., has been approved by WAA. The sale price was listed at $3 million, 592 thousand.

OBITUARIES

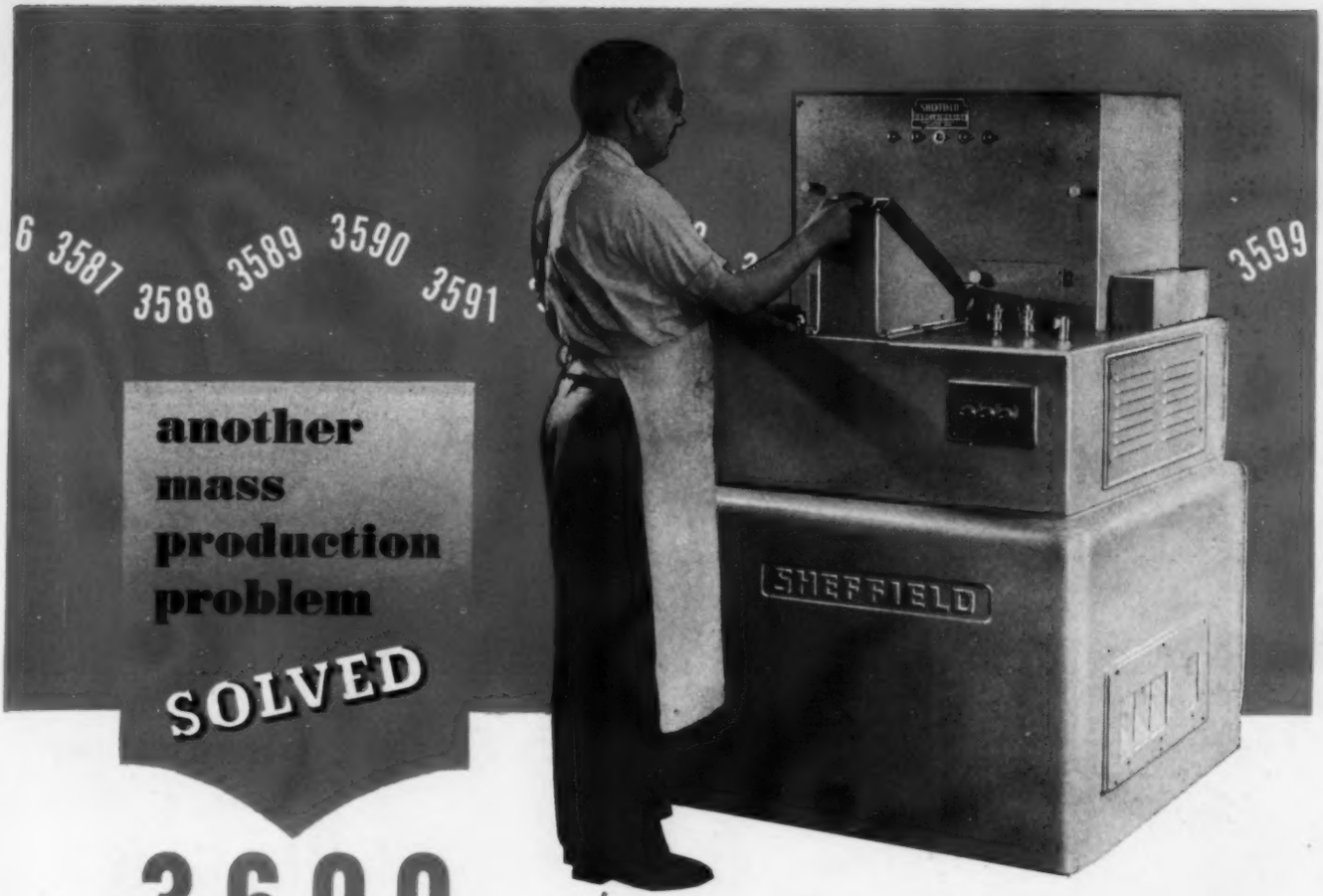
Arthur L. Kent, 73, president of the Endicott Forging Co., died recently in Binghamton, N. Y.

Raymond T. Cloyes, Cleveland, owner and manager of the Cloyes Gear Works, died Oct. 29. He came to Cleveland in 1910 as director of engineering research at Nela Park, later becoming sales manager of the Lees-Bradner Co., a position he held until he formed his own company in 1920.

Albert Bayton, 77, former superintendent of the Reed Mfg. Co., Erie, Pa., died recently in Phoenix, Ariz., where he had made his home for the past three years.

William Titerington of Union, N. J., general foreman of the welding shop at the Worthington Pump & Machine Corp. plant, Harrison, N. J., died Nov. 13.

Carl W. Littler, former chief engineer of the Jones & Laughlin Steel Corp., died Nov. 11 at his home in Cleveland. He retired last January.



another mass production problem SOLVED

3600 *pistons classified per hour*

Shock absorber pistons come by conveyor from the centerless grinders to this Sheffield "Airlectric" Automatic Gaging Machine for inspection and dimensional classification.

The operator merely feeds the pistons into a chute. The "Airlectric" then automatically segregates undersize and oversize units. At the same time, those which fall within tolerance limits are separated into five classifications for subsequent selective assembly—and at the rate of 3600 units per hour.

If you require accurate inspection on large volume production, you can make material savings with machines similar to that described here. *Chek with Sheffield* on multiple and automatic gaging problems.

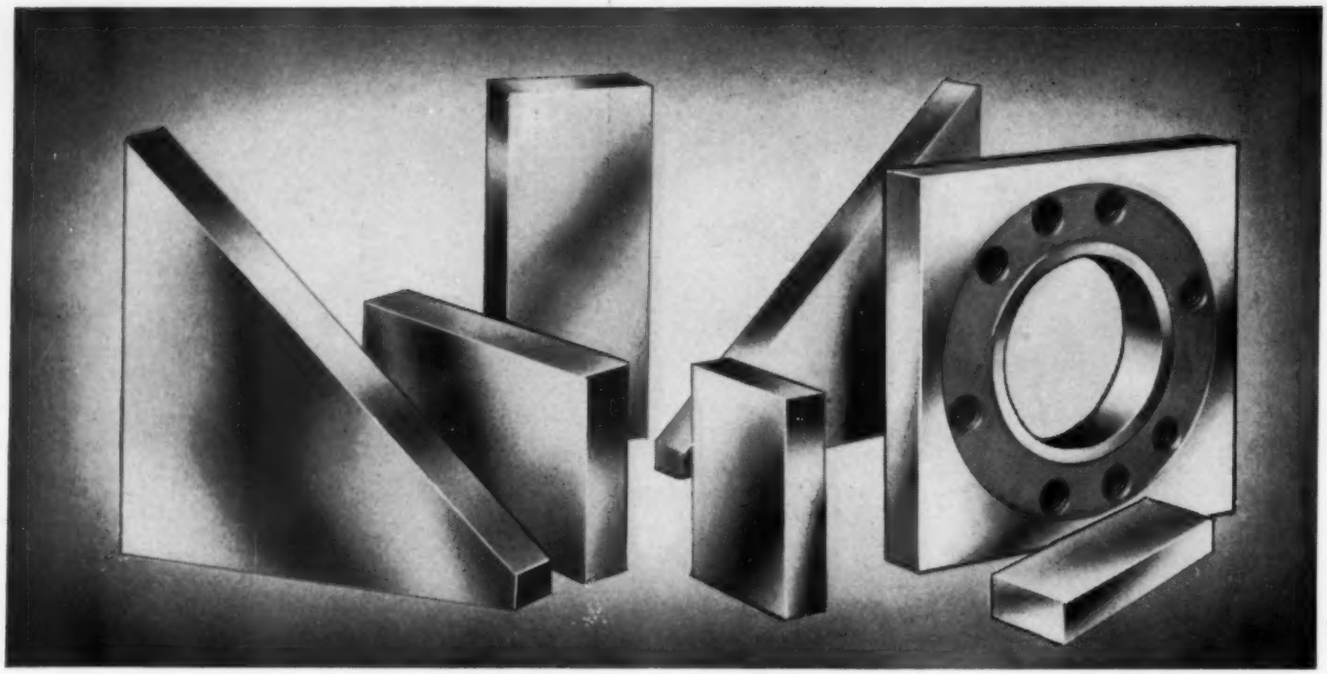
the *Sheffield* corporation

Dayton 1, Ohio U. S. A.

Standard Gages Shipped in 24 Hours

Sheffield MASTER CRAFTSMEN

2580



for frequent inspection of a recurring dimension

. . . rely on *Carblox* by Webber

Carblox
WEAR BLOCKS

Carblox Wear Blocks are specifically designed to permit frequent use of master gage blocks without exposing them to excessive wear. Two hard carbide blocks act as buffers as they are fitted into the work. Available in two sizes .100" and .050", $21.50 and $27.50 respectively with case.

When one dimension or angle requires repeated inspection, special carbide gage blocks can save time, money and improve accuracy. There is no need for the assembly of individual blocks every time a check is necessary. The special blocks permit fast examination of work in production or assembly. They can be used continuously for a long period of time without affecting their micro-accuracy.

These blocks are available in standard or special dimensions. Write for prices, mention size or angle desired.

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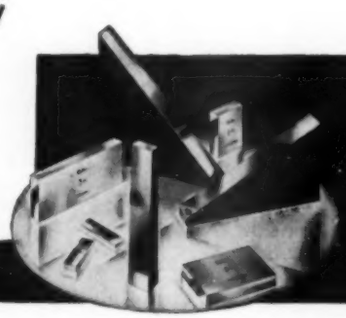
WEBBER MAKES PRECISION GAGE BLOCKS EXCLUSIVELY

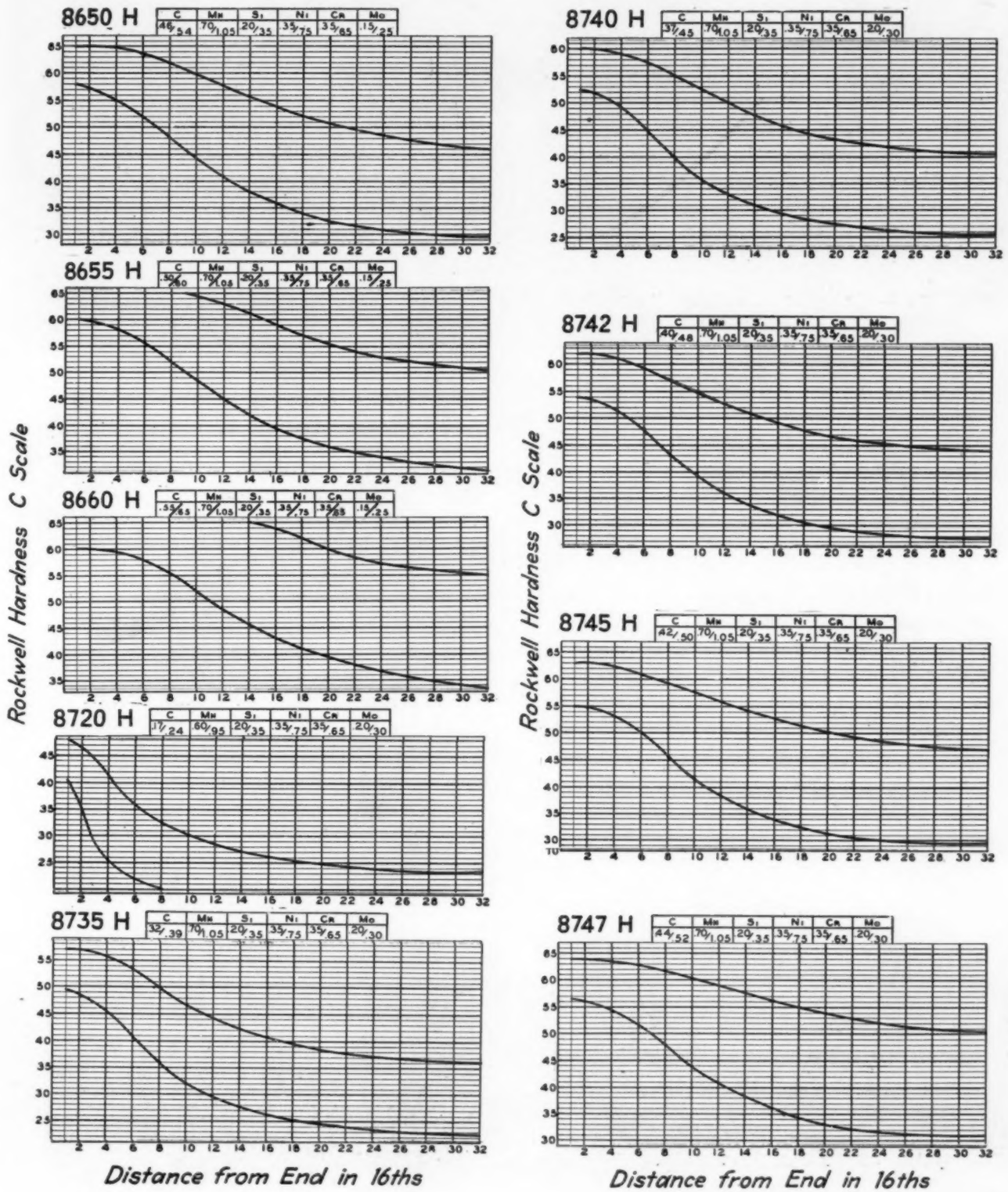
- ★ Gage Block Sets in Steps of .00005".
- ★ Individual Special Size Blocks.
- ★ Heavy Duty Gage Blocks.
- ★ Angle Gage Blocks in Steps of one second.
- ★ Carblox (Carbide) Wear Gages.

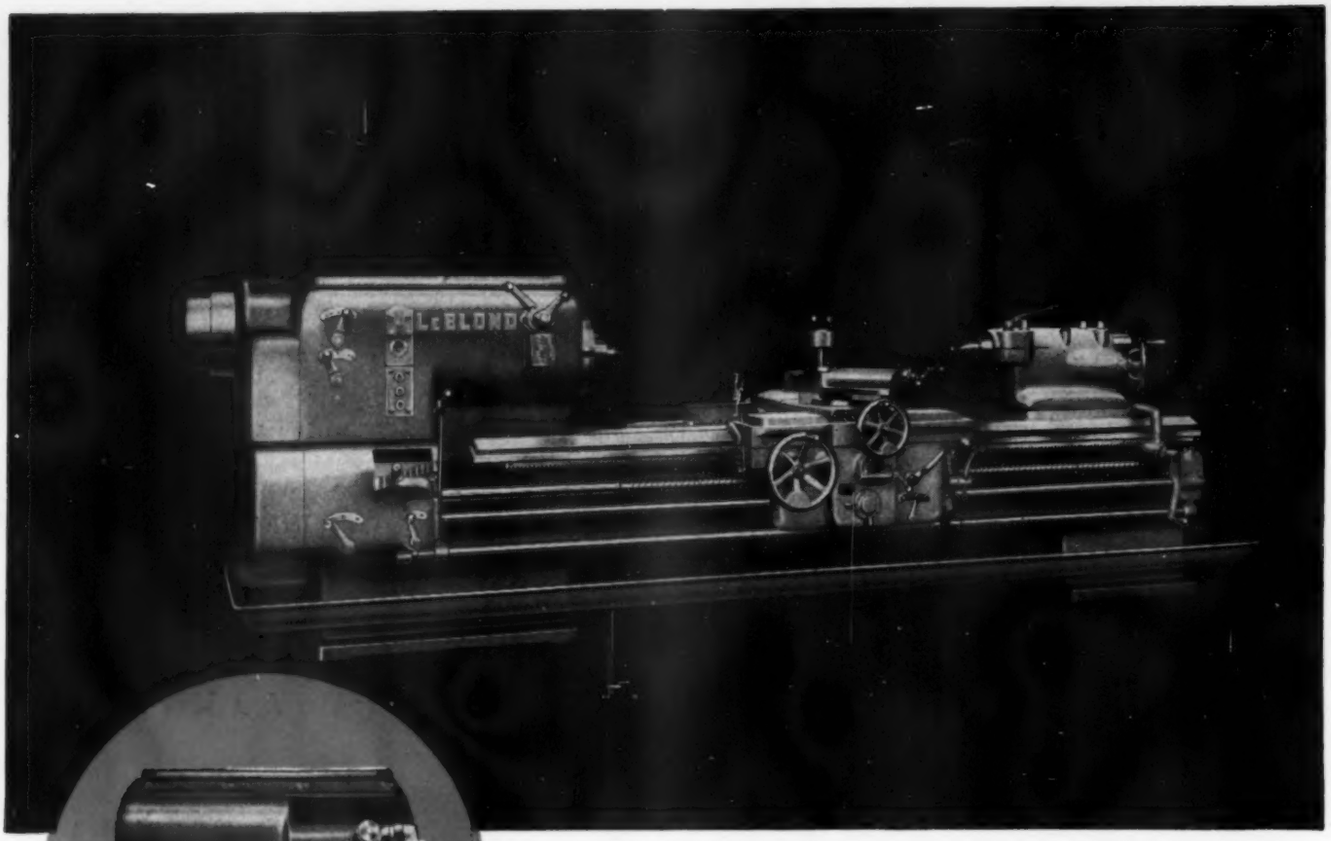


Webber
PRECISION
GAGE BLOCKS

Hardenability Bands for H-Steels—VII

COURTESY AMERICAN IRON & STEEL INSTITUTE AND SOCIETY OF AUTOMOTIVE ENGINEERS





Now, a new 25" Heavy Duty Engine Lathe with Feed Box Totally Enclosed

25" STANDARD FEATURES:

- Feed box totally enclosed, automatically lubricated.
- 16-speed geared headstock.
- All high speed gears in headstock hardened and ground.
- 3-bearing spindle.
- One-piece apron with positive jaw feed clutch.
- Thrust-lock tailstock with worm and rack construction; full length bearing for a spindle.
- Flame-hardened and ground steel bed ways front and rear.

The new 25" LeBlond Heavy Duty Engine Lathe has it . . . a totally enclosed, automatically lubricated, quick change box. Gears are inside a protective, oil-tight casting which chips and other abrasive matter positively cannot penetrate. Clean, filtered oil supplied continuously, automatically.

Think what this one improvement alone means in longer gear life . . . easier operation . . . elimination of all feed box maintenance. And there are many other important advantages in the new LeBlond 25". For complete and detailed description, send for Bulletin HD-151.

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
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CHICAGO 6, 20 N. Wacker Drive, STA 5561.
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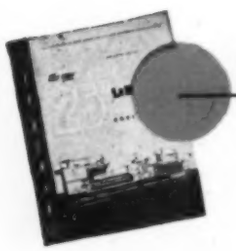

Get your free copy

of new illustrated Bulletin HD-151 describing LeBlond's 25" Heavy Duty Engine Lathe. Write Dept. HD-251.

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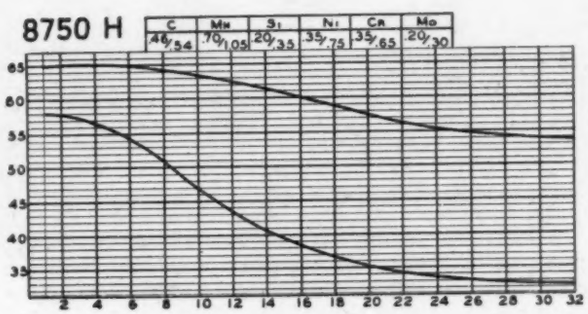
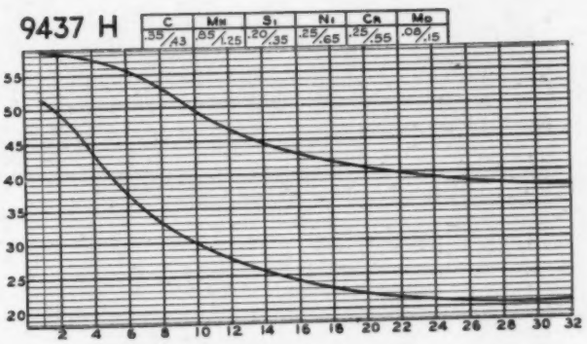
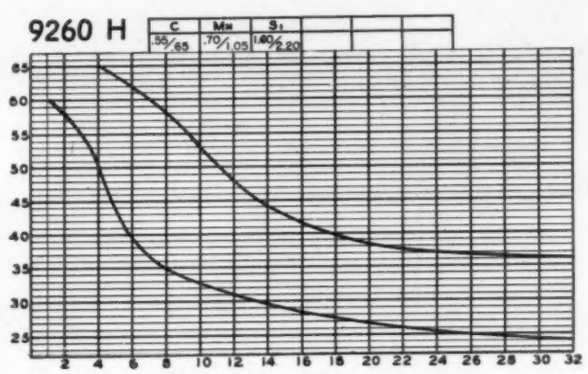
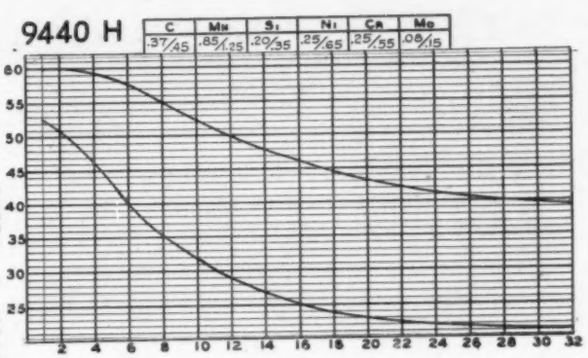
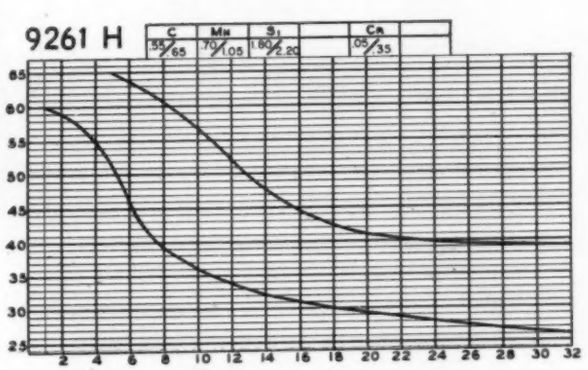
Hardenability Bands for H-Steels—VIII

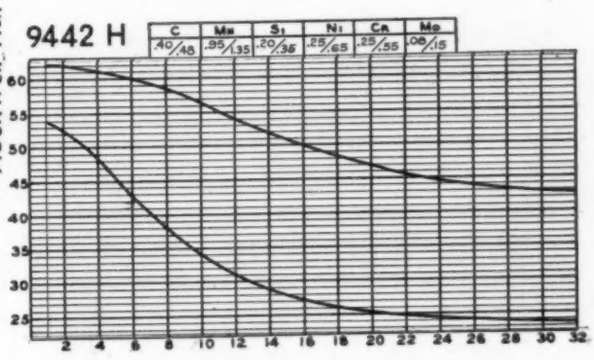


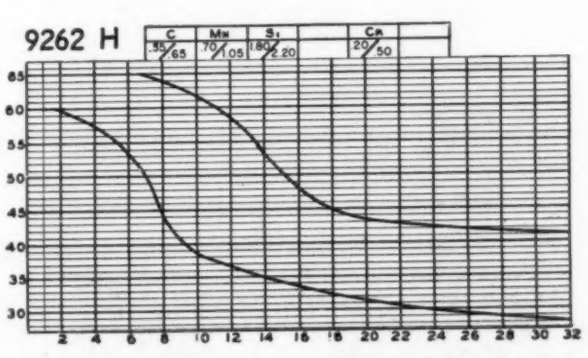


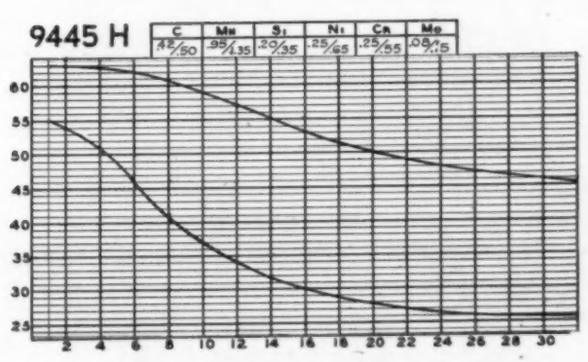












Rockwell Hardness C Scale

Rockwell Hardness C Scale

Distance from End in 16ths

Distance from End in 16ths

Faster Cutting, Longer Tool-Life, Reported for the New Sun Cutting Fluids Containing No Animal or Vegetable Fatty Oils

Since Sun recently announced the new grades of Sunicut with Petrofac, favorable performance reports have been coming in on practically every kind of metal-cutting job.

Higher cutting speeds, longer tool-life, increased production, better finish, performance superior to that of any cutting oils previously used . . . these are the "Job Proved" results that are constantly being reported.

"10% increase in tool-life on our automatics" . . . "chaser-life increased 50% on pipe-threading machines" . . . "finer finishes" . . . "best cutting oil I have ever used" . . . say typical reports from our customers.

No animal or vegetable fatty oils go into the new Sunicut grades. The Petrofac used in compounding is entirely derived from petroleum. The new Sunicut Cutting Oils with Petrofac possess superior metal-wetting and anti-welding properties, as well as unusual extreme-pressure characteristics.

Sunicut with Petrofac will not turn rancid. It is available in plentiful supplies and at reasonable, stable prices. Call in your Sun Cutting Oil Engineer for full information, or write Department AM12.

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"Makers of the well-known Sunoco Emulsifying Cutting Oil"
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SUN INDUSTRIAL PRODUCTS

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*Petrofac is a trade-mark of Sun Oil Company

American Machinist

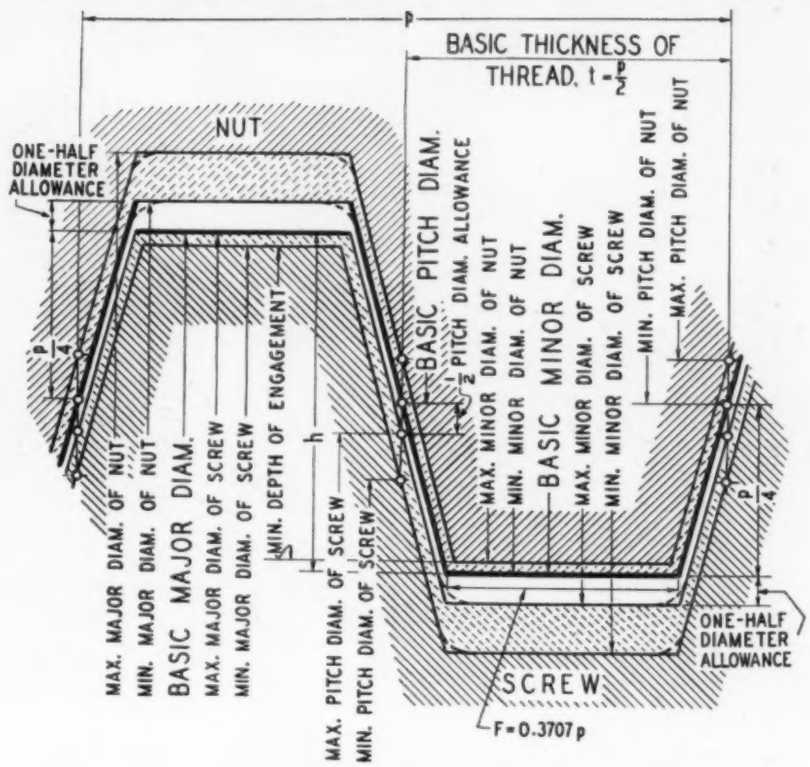
REFERENCE BOOK SHEET

Acme Thread Calculations

BY J. S. ROJAHN
Threading Engineer,
LANDIS MACHINE COMPANY

It is difficult to carry out calculation of the dimensions and tolerances of elements of Acme threads, both general-purpose and centralizing types, because the information is scattered through the reference publications: American War Standard B1.5-1945 or The National Bureau of Standards Handbook H28-1944. The latter is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, for 60 cents.

These texts must be searched for the proper formulas. Moreover, the problem is complicated by the existence of the two general applications of Acme threads—general-purpose and centralizing—and five classes of fits, as well as the absence of any accepted series of diameter-pitch combinations. The calculation of the thread elements is made easier by reference to the tabulated page references for Handbook H28.



Allowances, tolerances, and crest clearances, for general-purpose Acme threads
Notation: p = pitch, h = basic thread depth; heavy lines show basic size

General-Purpose Threads (All Classes)

BASIC

(1) Major diameter = D
(2) Pitch diameter = (1) $- \frac{p}{2}$
(3) Minor diameter = (1) $- p$

SCREW

Major Diameter
(4) Maximum = D
(5) Tolerance = (table 93, col. 7)
(6) Minimum = (4) — (5)

Pitch Diameter
(7) Allowance = (table 94, cols. 3, 4, 5)
(8) Maximum = (2) — (7)
(9) Tolerance, class 2 = (table 95)
class 3 = (table 96)
class 4 = (table 97)
(10) Minimum = (8) — (9)

Minor Diameter
(11) Maximum, $p > 0.1$ = (3) —0.020″
$p < 0.1$ = (3) —0.010″
(12) Tolerance = 1.5 × (9)
(13) Minimum = (11) — (12)

DEPTH
(14) Maximum = (4) — (13)
(15) Minimum = (6) — (11)
(16) Tolerance = (14) — (15)

NUT

Major Diameter
(17) Maximum, $p > 0.1 = D + 0.040''$
$p < 0.1 = D + 0.020''$
(18) Tolerance, $p > 0.1 = 0.020''$
$p < 0.1 = 0.010''$
(19) Minimum (17) — (18)

Pitch Diameter
(20) Minimum = (2)
(21) Tolerance = (9)
(22) Maximum = (20) + (21)

Minor Diameter
(23) Minimum = (3)
(24) Tolerance = (table 93, col. 6)
(25) Maximum = (23) + (24)

DEPTH
(26) Maximum = (17) — (23)
(27) Minimum = (19) — (25)
(28) Tolerance = (26) — (27)

Centralizing Threads (All Classes)

BASIC

(1) Major diameter, classes 2, 3, 4, = D
classes 5 & 6 = $D - 0.025\sqrt{D}$
(2) Pitch diameter = (1) — $p/2$
(3) Minor diameter = (1) — p

SCREW

Major Diameter
(4) Maximum = (1) — 12
(5) Tolerance = (table 93, cols. 9, 10, 12)
(6) Minimum = (4) — (5)

Pitch Diameter
(7) Allowance = (table 93, cols. 3, 4, 5)
(8) Maximum = (2) — (7)
(9) Tolerance, class 2 = (table 95)
classes 3 & 5 = (table 96)
classes 4 & 6 = (table 97)
(10) Minimum = (8) — (9)

Minor Diameter
(11) Maximum, $p > 0.1$ = (3) —0.020″
$p < 0.1$ = (3) —0.010″
(12) Tolerance = 1.5 × (9)
(13) Minimum = (11) — (12)

DEPTH
(14) Maximum = (4) — (13)
(15) Minimum = (6) — (11)
(16) Tolerance = (14) — (15)

NUT

Major Diameter
(17) Allowance (table 93, col. 4)
(18) Minimum = (4) + (17)
(19) Tolerance = (table 93, cols. 9, 11, 13)
(20) Maximum = (18) + (19)

Pitch Diameter
(21) Minimum = (2)
(22) Tolerance = (9)
(23) Maximum = (21) + (22)

Minor Diameter
(24) Allowance = (table 93, col. 5)
(25) Minimum = (3) + (24)
(26) Tolerance = (table 93, col. 6)
(27) Maximum = (25) + (26)

DEPTH
(28) Maximum = (20) — (25)
(29) Minimum = (18) — (27)
(30) Tolerance = (28) — (29)

for high or low speed *portable grinding...*

use SIMONDS ABRASIVE WHEELS

For foundry and steel mill snagging... spot grinding... smoothing welds and grinding in hard-to-reach places, Simonds Abrasive Wheels hold their shapes to give cool cutting, long lasting action on high and low speed operations. Wheel shapes include straight and flaring type cup wheels, cones, pot balls and blind-end wheels in various sizes. Simonds Abrasive Resinoid Bonded Wheels are recommended for grinding speeds up to 9500 surface feet per minute... Vitrified Bonded Wheels for speeds up to 6500 surface feet per minute. Ask any Simonds Abrasive distributor for details on Simonds Abrasive Wheels for portable grinders or send for our Snagging Wheel Bulletin.

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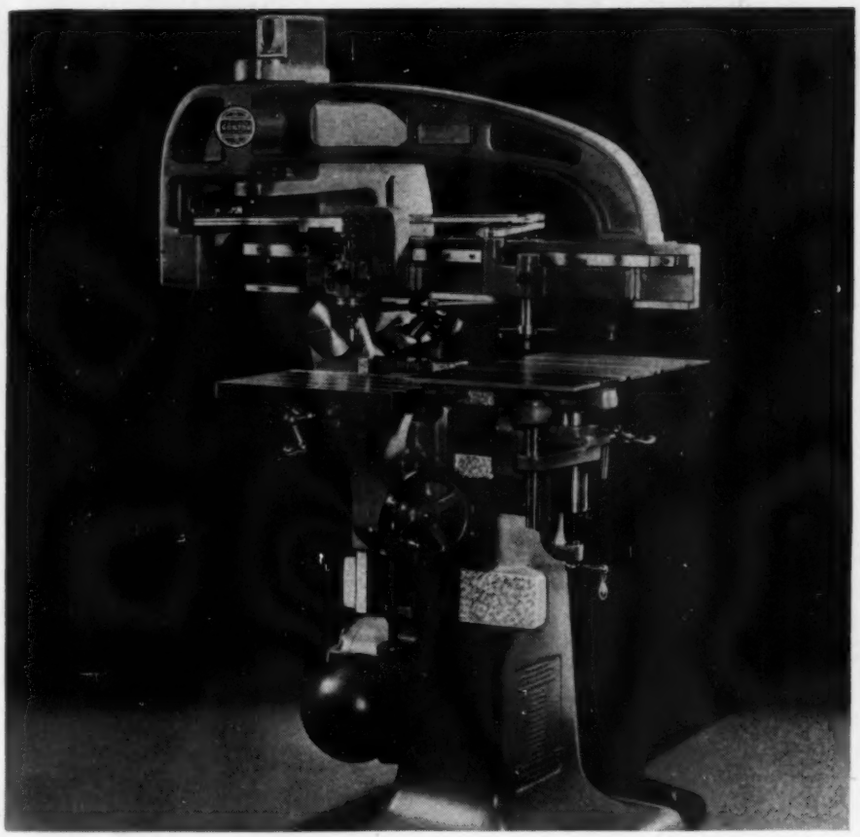
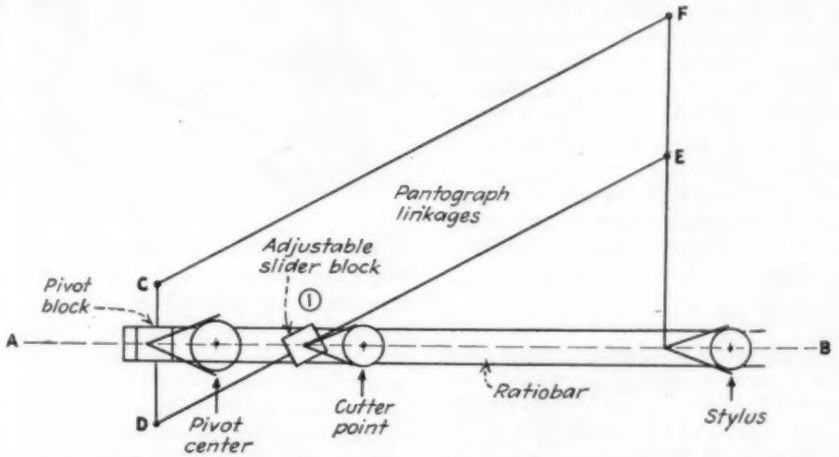
Distributors in All Principal Cities

Shop Equipment News

Gorton Three-Dimensional Pantograph Features Ratiobar



Pivot center, cutter spindle and stylus are in a straight line on this machine



Only one slider block (1) is used to adjust for whatever reduction ratio is desired. Dotted line A-B of the Ratiobar is straight at all times because stylus, cutter spindle and pivot center are integral with bar. Area C-D-E-F likewise remains a true parallelogram

The P13 three-dimensional pantograph engraving machine with Ratiobar tracer control has been announced by George Gorton Machine Co., Racine, Wis. The machine is directly comparable to the Gorton 3-U two-dimensional pantograph and incorporates the same reduction ratios with the exception of 1:1.

The P13 employs an enlarged three-dimensional master or pattern which is mounted on the copytable. Surface of the master is traced manually with the tracing stylus while the cutter reproduces at desired ratio of reduction. The machine is also easily adapted for general two-dimensional light milling and engraving.

A fundamental design change is incorporated which is said to simplify and improve operation of the machine. The Gorton Ratiobar, supported at either end by a delicately balanced overarm, aligns pivot center, cutter spindle and tracing stylus in a straight line. The bar is pivoted horizontally, and there are two hardened and ground steel tracks mounted on it. The tracer stylus and spindle float on ball bearings which travel on these tracks.

As the tracer moves out and away from the pivot center, the pantograph linkages move toward the center, which is said to provide a better balance than on conventional machines where linkages move out with the stylus. Another feature of the Ratiobar is that it supports the weight of the entire pantograph mechanism.

Ratios from 2:1 to 40:1 are available. The bar itself is graduated only for seven reductions from 2:1 to 16:1, but other reductions can be readily adjusted because only one sliding adjustment is necessary. By reversing the position of the stylus and cutter assemblies, work can be enlarged.

The machine can produce small, intricate dies, molds, stamps and hobs in addition to the conventional work generally associated with light

pantograph machines. When used with the Gorton roll attachment, it can do light milling and engraving on cylinders, rolls, tubes, dials or on any peripheral surface.

The cutter spindle has a 5/16-in. dia. hole for straight-shank cutter. The spindle is a self-contained unit and can be quickly removed so that cutters can be ground in place in the spindle. This feature would permit cutters to be ground true for extremely accurate work.

Cutter-spindle feed is 5/16 in. At 2:1 reduction, the area covered by the cutter point is 4½x9½ in., and vertical movement (exclusive of feed) is 1 in. There are six spindle speeds from 4560 to 18,000 rpm. Crossfeed of the worktable is 5 in. with work 0 to ¾ in. thick; with work over ¾ in. thick it is 2⅞ in. Vertical feed of the table is 9¾ in., and size of the table itself is 8x12 in. The machine is furnished without copyholder.

Rotational and Linear Speeds Read by GE Electric Tachometer

A hand-held electric tachometer weighing 3 lb., made by Special Products Div., General Electric Co., Schenectady 5, N. Y., is designed to give readings of linear speeds from 10 to 10,000 fpm., and of rotational speeds from 100 to 10,000 rpm. With the use of accessories, rotational speeds from 10 to 100,000 rpm. may be measured.

The tachometer consists of two units: the head, which is placed in contact with the moving object, and the indicating unit to which the head is attached by a flexible electric cable. Accurate speed indications are said to be assured by a driving torque of only ¼ oz.-in. Measurements can be both clockwise and counter-clockwise. The instrument is furnished in a carrying case.

Electronic Measuring Performed by Five Brown & Sharpe Developments

Several developments in electronic measuring equipment have been announced by Brown & Sharpe Mfg. Co., Providence, R. I.

Amplifier No. 950 is illustrated (above left) seated on top of Signal Light attachment No. 958. The amplifier permits settings from 0.00001 to 0.0001 in. It is a separate unit, and all heat-generating equipment contained in it is separated from the actual measuring apparatus. The graduation selector can be set for readings in 0.0001, 0.00005, 0.000025, 0.00002 and 0.00001 in., and measurements between graduations can be made to match tolerance limits on work being tested.

The Signal Light attachment is for those who wish to utilize colored signal lights to tell when work is too large, too small or within limits.

External comparator No. 951 (at right in illustration) has a range from 0 to 4 in. and measures by 0.00001 to 0.0001 in. Setting requires only one master. The anvil is reversible and provides a narrow surface for small or irregular parts in addition to those handled by its regular surface.

Internal comparator attachment No. 952 (not illustrated) is used with the external comparator and is inserted in place of the anvil. Range, by means of interchangeable plugs, is ½ to 2 in. Measurements can be made by 0.00001 to 0.0001 in., and only one master is required.

Gagehead cartridge No. 953 (not illustrated) is also used with the above equipment. It is said to be frictionless, dustproof and moisture-proof. It lends itself to application in a variety of installations for jigs, fixtures, gages and other inspection devices.

SINGLE-ACTING MANUALLY-OPERATED pump and hydraulic ram is announced by Miller Hydraulic Engineering and Sales, 3615 Hart, Detroit 14, Mich. Control valve has positive action and permits lowering at any desired speed, regardless of position of operating handle. Three standard ram sizes are available in lifting capacities from 2210 to 8885 lb., based on 5000 psi. Ram can have any stroke, any type of bottom and any "top of plunger"

OUTPUT? ACCURACY?

"Really GOOD" says CENTURY MACHINE CO.

DO IT WITH A DUOMATIC

Duomatics are "Really GOOD" for production, is the opinion of Century Machine Company of Cincinnati, world famous producers of bakery machinery. Turning and facing gear blanks automatically, all the operator does is to start and stop the machine.

Men who really know . . . men who build fine machinery in their own plants quickly recognize the superiority of Lodge & Shipley 2-A and 3-A Duomatics. Comparing output, accuracy and time saved, they give Duomatic Automatic Lathes top ratings.

Lodge & Shipley Engineers will gladly show you authentic case histories, prove that even unskilled operators may out-produce several older lathes with a single Duomatic. Write for Bulletins 634 (3-A Duomatics) and 635 (2-A Duomatics.)

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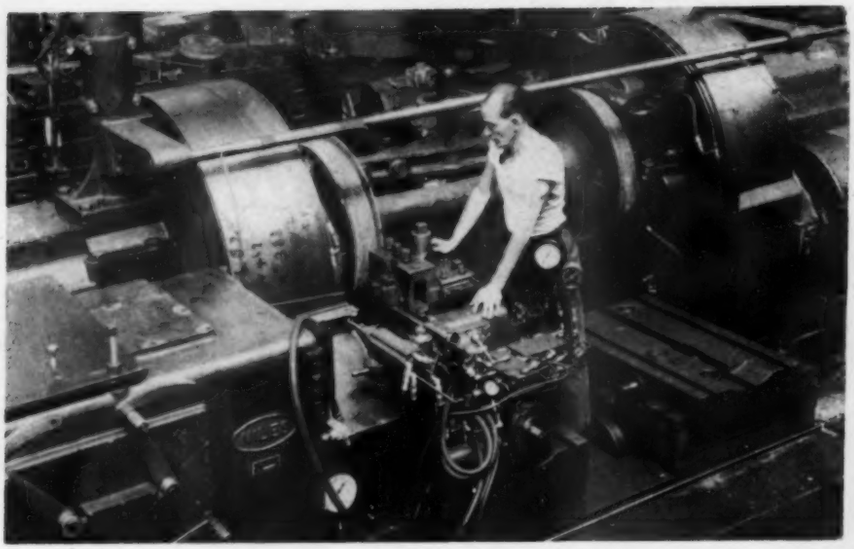


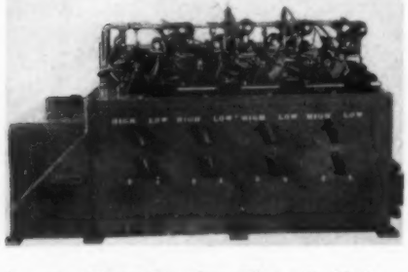
Hydraulic Profiling Attachments On Niles Car-Wheel Lathe Line

A line of car-wheel lathes developed by Niles Tool Works Co., Div. Lima-Hamilton Corp., Hamilton, Ohio, incorporates a new method to machine the tread of mounted steel wheels. Production results of less than 14 min. per wheel-set are said to have been accomplished.

Two hydraulic profiling attachments (one per wheel) replace the conventional four-turret-type forming-tool method. Each attachment uses one tungsten-carbide-tipped tool which makes one contouring pass over the entire tread. Depth of cut is to ¾ in., and feed is up to 1 in. per min.

The lathes incorporate hydraulic feeds, improved pneumatic driver dogs, and high faceplate speeds up to 24 rpm. There is a low faceplate-speed range for conventional machining by forming tools. A new method of rigid centering is also provided.

Results with the attachments are said to give concentric limits of 0.0015 to 0.005 in. and a smooth mirror-like finish that eliminates the need for grinding.



Agnew Four-Station Electric Unit Heats Knee-Action Control Arms

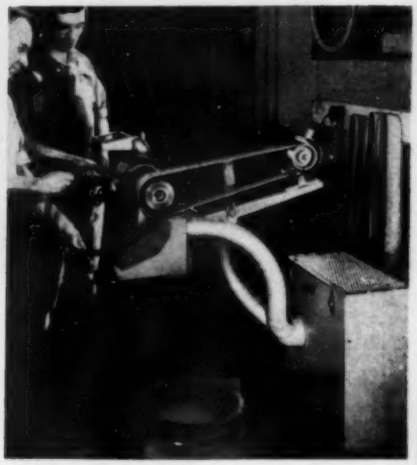
A four-station resistance electric heater, designed to accommodate knee-action control arms prior to forging operation, has been announced by Agnew Electric Co., Milford, Mich. Cycle of operation is automatic except for loading and unloading.

High-pressure clamping, accomplished hydraulically, is said to eliminate arcing in the dies. Photoelectric control of heating provides against over and under heating. Production rate is said to be 1000 heated pieces per hr. with one operator. Rapid heating is claimed to minimize scaling. The machine is designed to heat the core of the part first to provide better flow of the metal in upsetting operations.

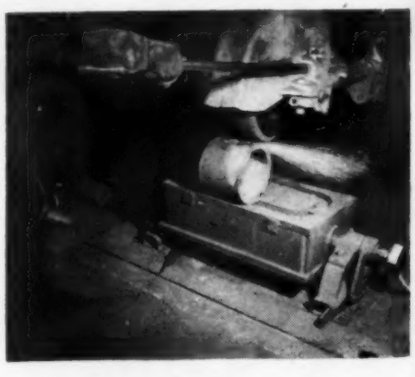
Micrometer Adjustable Boring Bar By Melin Bores Difficult Holes

A micrometer adjustable boring bar, especially adaptable for boring long holes, holes that are hard to reach, or boring a casting with a larger inside than outside hole, has been announced by Melin Tool Co., 3370 W. 140th St., Cleveland, Ohio. It is made in three sizes.

The Melin Precise boring bar is said to save from one-half to two-thirds in time on milling machines, turret lathes, jig bores, and horizontal boring mills. The toolbit is removable for sharpening or for replacement.



DUST COLLECTOR, Dustkop Model 420, a backstand attachment which changes a pedestal grinder to a dustless backstand sander-grinder combination, is made by Aget-Detroit Co., Main at Washington St., Ann Arbor, Mich. It is self-contained



Dings Hold-Tite Electromagnet Holds Castings for Grinding

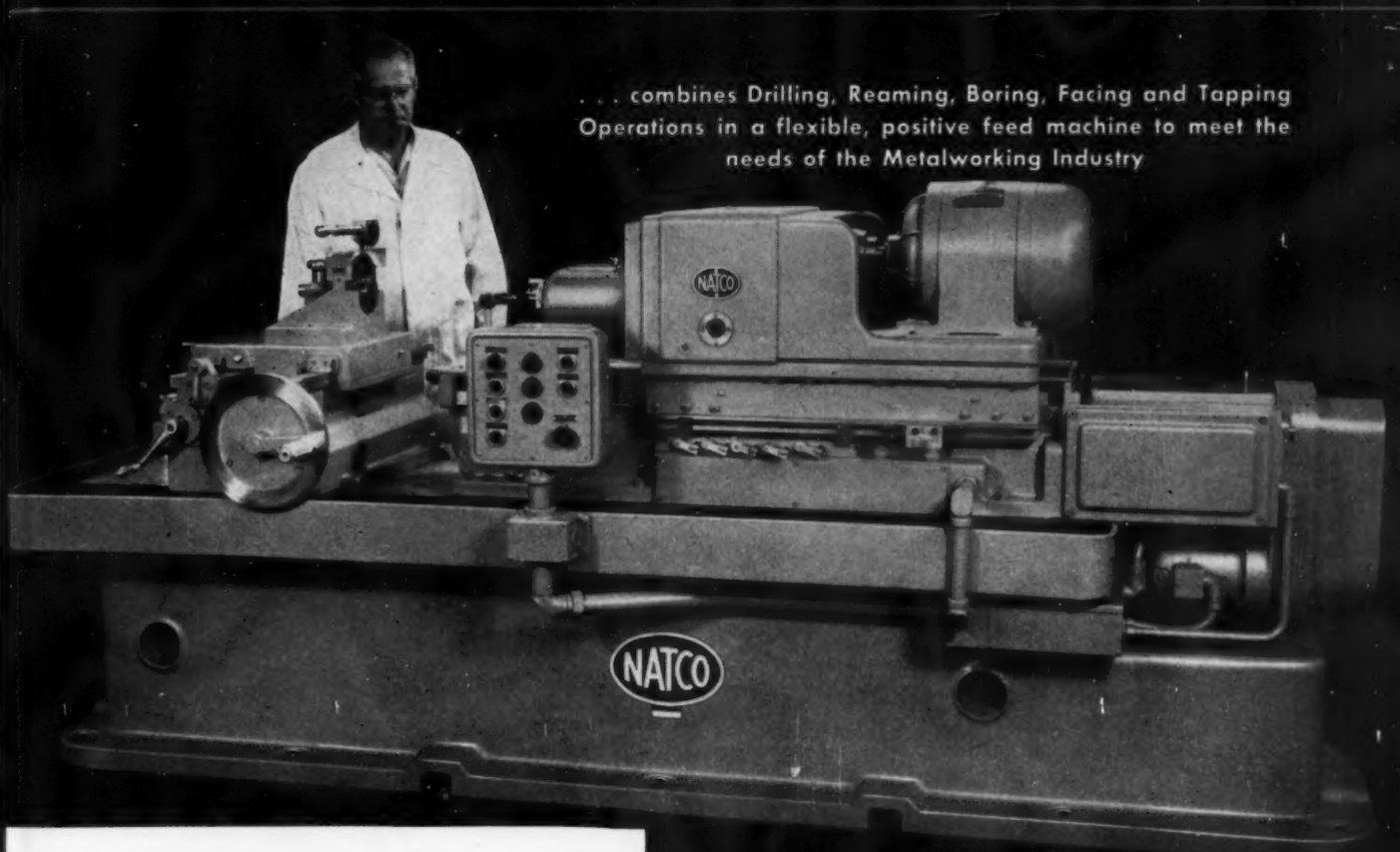
The Hold-Tite Magnet, an electromagnet for holding heavy castings in position under a swing grinder, is made in two sizes by Dings Magnetic Separator Co., Milwaukee, Wis.

The magnet is said to hold castings of any shape securely and to reduce overall grinding time as much as 25%. It is available on a tilting trunnion with seven positions controlled by foot lever, or as a base magnet. Consumption for the larger size, 16x29½ in., is 600 w.; for the smaller size, 16x16 in., is 400 w.

New NATCO A-42 ELECTRONIC

Mechanical Feed Unit... Entirely Self-Contained

FEEDS IN BOTH DIRECTIONS



. . . combines Drilling, Reaming, Boring, Facing and Tapping Operations in a flexible, positive feed machine to meet the needs of the Metalworking Industry

This highly adaptable NATCO A-42 Electronic Mechanical Feed Unit provides electronically controlled automatic work cycles such as rapid traverse forward, coarse feed forward, fine feed forward, dwell, rapid traverse return, and stop, or rapid traverse forward, feed forward, feed backwards, rapid traverse return, and stop, and many other combinations. The unit can be mounted in any position to form a part of highly specialized machines made up of combinations of NATCO units for high production of a wide variety of work. Write Dept. A for NATCO Bulletin 747.

NATCO DRILLING, BORING, TAPPING AND FACING MACHINES

At the Machine Tool Show this machine demonstrated the speed and efficiency of its electronic control by operating automatically in response to voice impulses.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.

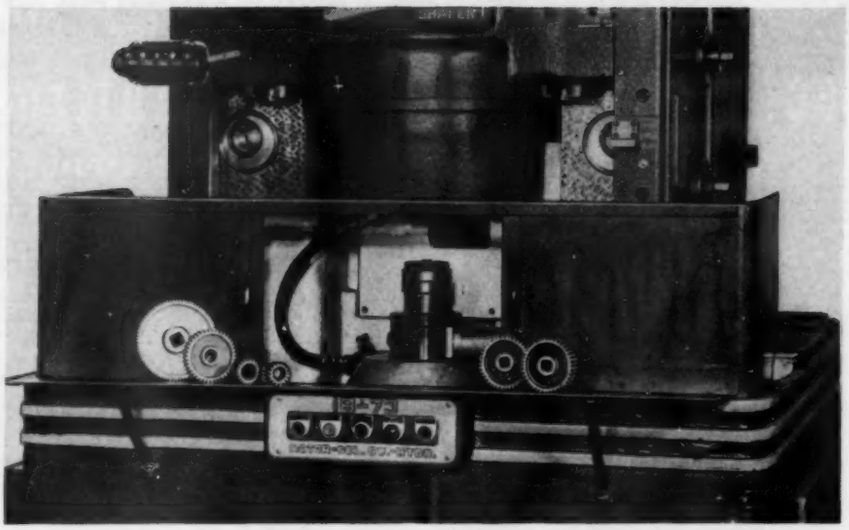
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

Call a Natco Field Engineer

Yale & Towne Hand-Guided Truck Equipped with Tilting-Fork Unit

Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa., announces a hand-guided fully powered electric Worksaver truck with a tilting-fork unit. Capable of functioning like the conventional full-size electric-fork truck, it is small enough for work in corners and spaces inaccessible to lift trucks which are ridden rather than led.

The truck weighs 3200 lb. with battery. It lifts 3000 lb. with load not over 28 in. long, and 2000 lb. if load is 48 in. long. It hoists to a height of 58½ in. and tilts 21°. There are two speeds forward and two speeds in reverse. Inside turning radius is 31 in. and outside turning radius is 81 in.



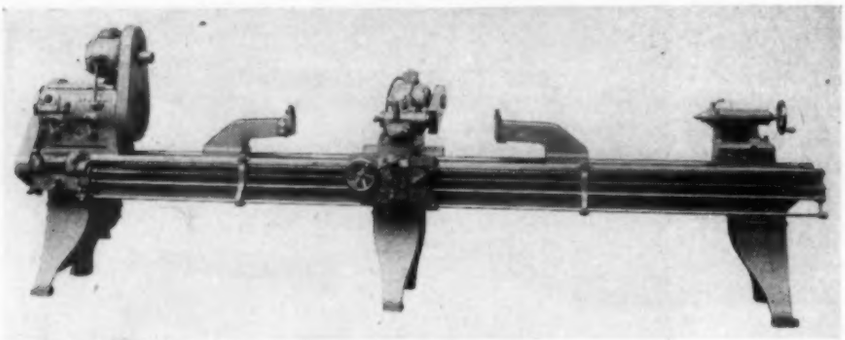
Tools Feed Radially from All Sides On Michigan's Shear-Speed Shaper

The Shear-Speed shaper line, originally used for cutting gears, is now said to cut almost any external shape which can be produced "internally" by broaching. Made by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., the machines will cut various types of cams, including over-running clutches; splines, both straight-sided and involute; toothed clutches; and many types of special external forms.

The shapes are cut by formed tools which feed in radially from all sides. Work is reciprocated while the tools are fed to correct depth. Tools are automatically retracted for relief on return stroke.

Automatic feed adjustment during cutting cycle approximately balances cutting load on each stroke. A fairly coarse feed is used during preliminary strokes, becoming finer as more of the tool cutting edge is employed, resulting in a fine feed for finishing strokes.

Parts up to 10-in. dia., and 2¾-in. face width can be handled on the present line. Several narrow-faced parts can be cut simultaneously. Cutting-cycle time ranges from 13 to 50 sec. per piece, depending on amount of stock to be removed.



LeBlond Two-Purpose Engine Lathe Polishes Rubber Printing Rollers

A two-purpose lathe which polishes rubber printing rollers on a production basis, as well as performing standard engine lathe metal turning, has been announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. It is known as the Regal rubber roller polishing machine.

Grinding action at 4125 rpm. is obtained through a special variable-pitch drive which revolves the roller clockwise, while a 2 hp., 2325 rpm. grinder on the cross-slide rotates in the opposite direction. Two rests are incorporated to seat the steel core of the roller. LeBlond Regals are available in six swing sizes from 13 to 24 in., with the polishing machine usually built on the 19-in. model which swings 19¼ in. over the ways, with beds any length starting at 6 ft.

Air-Hydraulics Arbor Press Controlled by Foot-Pump Unit

Air - Hydraulics, Inc., 401 Broadway, New York 13, N. Y., makes a 10-ton foot-operated hydraulic arbor press. Each stroke of the fast-speed center pedal moves the ram ⅞ in. down to work. The right pedal or power pump moves ram down 1/16 in. with each stroke. The left pedal returns ram to original position. A removable screen is fitted to oil reservoir to keep out foreign matter. The unit delivers pressures to 20,000 lb.

Elevator-Escalator Makers, too, "Get a Lift" in assembly speeds and sales appeal

. . . when AMERICAN PHILLIPS SCREWS Fasten Better Faster!

Here's the PRODUCTION "LIFT"—Production goes up, cost goes down for elevator-escalator builders, appliance, furniture, auto and other manufacturers who assemble with fast fumble-proof, automatically straight-driving American Phillips Screws! This *maintained* speed means TIME SAVINGS UP TO 50%—with a bonus in no scars or work spoilage and added safety for workers.

Here's the SALES APPEAL "LIFT"—No burrs to catch hose or clothes with this smart, decorative, straight-set screw head that speaks quietly of solid construction from here on in—that's the American Phillips Screw. Why not get these competitive advantages in speed, sales and COSTS today? Write:

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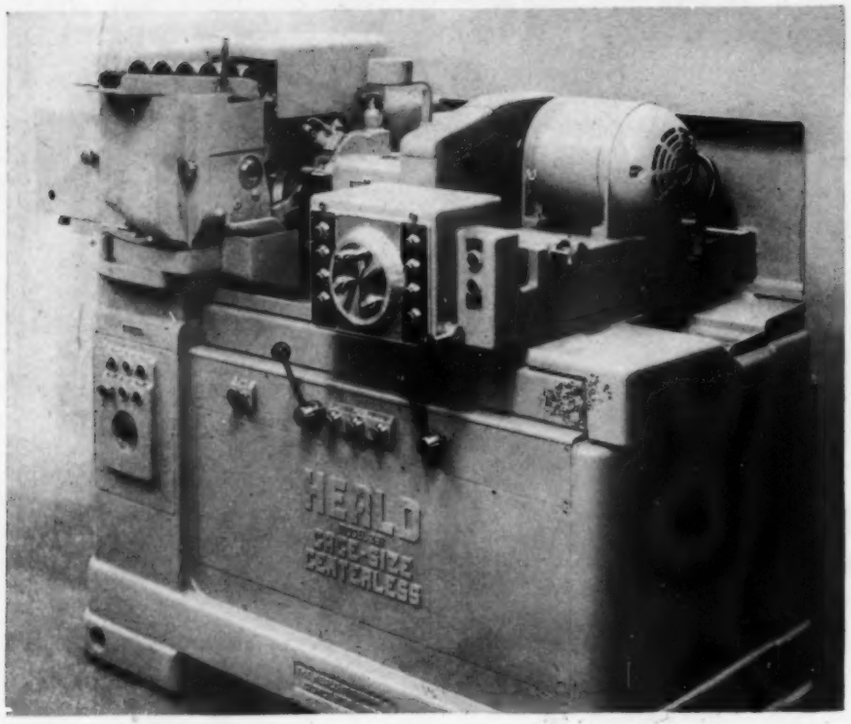
4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



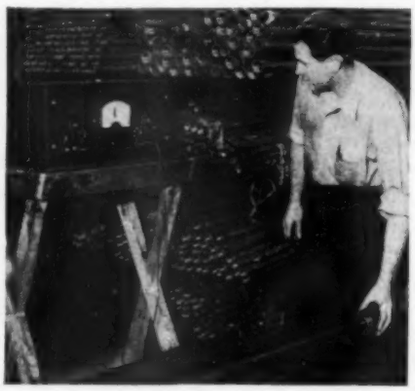
Two Centerless Internal Grinders Made by Heald for Mass Production

Models 281 and 381 centerless internal-grinding machines have been added to the line of The Heald Machine Co., Worcester 6, Mass. They are designed for mass-production grinding of parts that can be rotated on their outside diameters while grinding the bore. The machines can be furnished in both Gage-Matic or Size-Matic models or in combination Gage-Size models. One operator can handle several of these automatic machines.

Features common to both grinders include a new feed mechanism arranged so that rate and amount of finishing and roughing feeds as well as amount of retraction and compensation are set by turning graduated knobs on the feed box. Indicator readings show correct wheelhead-belt tension. Sealed-in permanent lubrication of workhead and grindinghead is said to provide cool operating temperatures. Hydraulic pump and tank are isolated to minimize base changes from heat and to eliminate a possible source of vibration.

Model 281 can handle work with max. O.D. of 4½ in. Max. length of hole that can be ground is 3 in., and min. dia. of hole that can be ground is ¼ in. Table speeds are from 0 to 30 fpm. Table travel is 8½ in.

Model 381 can handle 9-in. O.D. work and grind holes 6 in. long. Min. hole is 3-in. dia. Table speeds are from 0 to 40 fpm., and table travel is 12 7/16 in. Both machines can, in some cases, handle smaller hole sizes.

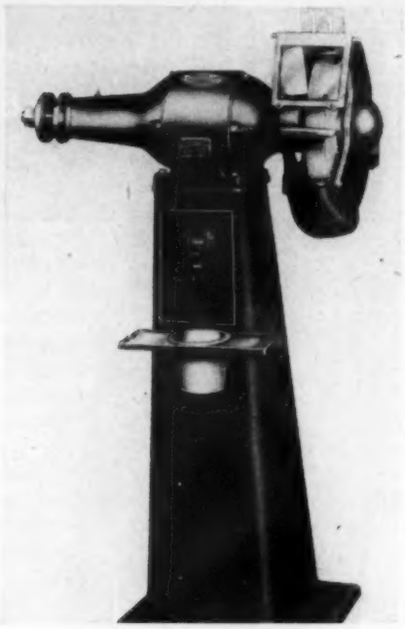


Non-Destructive Comparator By GE Separates Metal Parts

Special Products Div., General Electric Co., Schenectady, N. Y., announces an electronic instrument called the metals comparator, providing quick, non-destructive comparison of either magnetic or nonmagnetic metal parts with a standard. The unit can be used to differentiate between annealed and unannealed steel bars, and to sort finished parts with different compositions or heat treatments.

A reference specimen is placed in a test coil to establish an initial balance, indicated by a zero reading on the indicator. After this specimen is removed, parts are inserted in the coil one by one. Specimens can be accepted or rejected on the basis of the dial reading.

The metals comparator is mounted in a steel cabinet about 11x17x22 in. and weighs less than 60 lb. It operates on 60 cycle commercial power at 115 v. Test coils ranging from ½- to 3-in. I.D. are available.

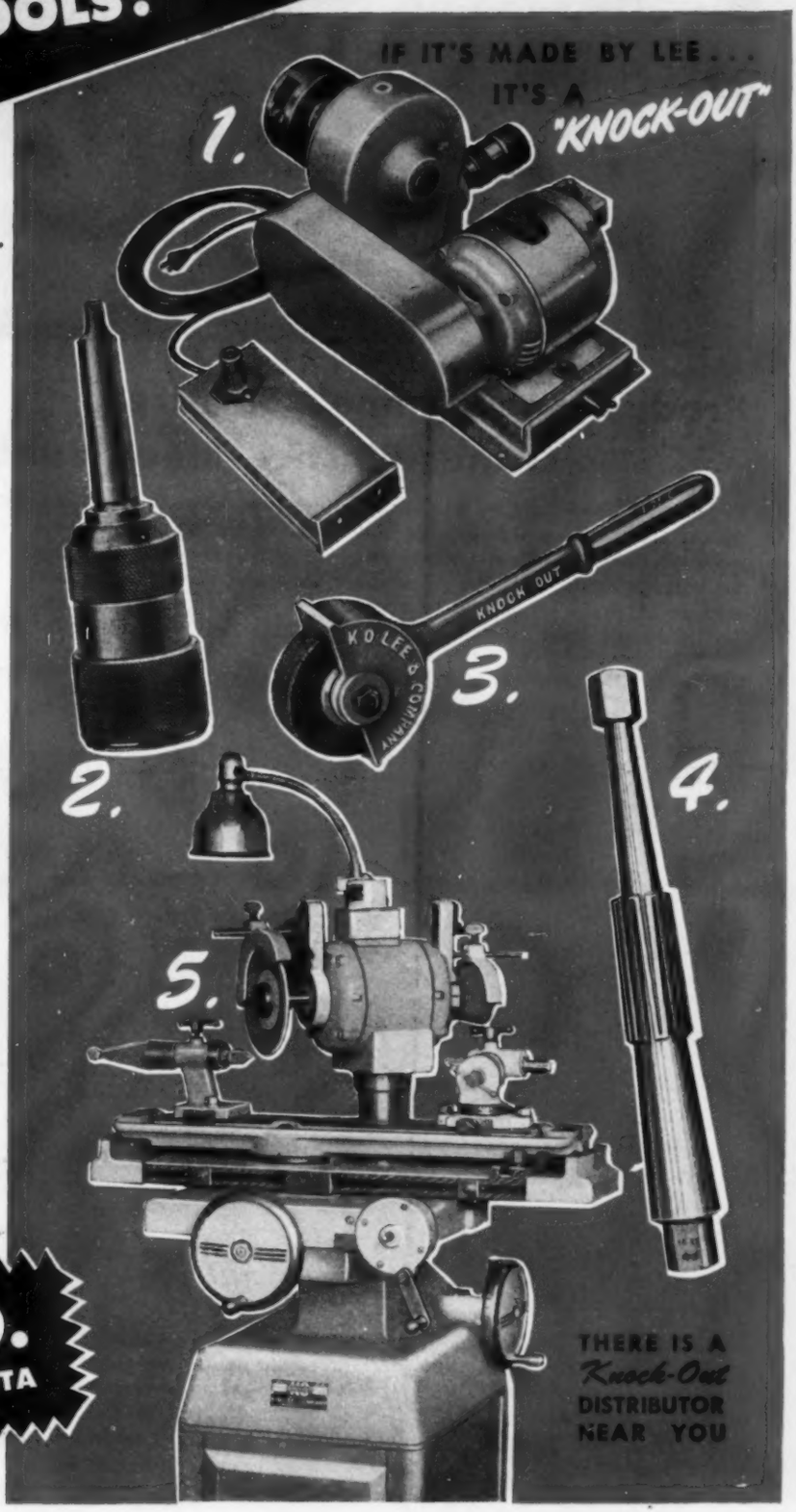


Bradford Grinders, Buffers Feature Single-Phase Motors

A line of Metalmaster bench- and pedestal-type grinders and buffer-polishers has been introduced by Bradford Machine Tool Co., 657 Evans St., Cincinnati 4, Ohio. They are equipped with full 1-hp., 110- to 220-v., single-phase motors.

Known as the "190" series, the machines are designed for small shops having single-phase supply. Eleven models make up the series. Model 190 is a double-wheel pedestal grinder. Model 191 (illustrated) is a combination grinder and buffer on a pedestal mount. Both of these units are available with bench-type bases and are then listed as Models 190B and 191 B. The rest of the line is made up of buffers. Models 192, 193 and 194 are pedestal buffers with distance between wheels of 23½, 31 and 39 in. respectively. Each of the units is available as a bench-type model. The last buffer is a low-stand model.

KNOCK OUT MORE PRODUCTION WITH "KNOCK-OUT" TOOLS!



1. *Knock-Out* REAMER DRIVES

Ream, hone, burnish, lap, etc. Has two-jaw universal chuck (1-5/8") K-O Keyless Drill Chuck (⅝"). Two models—40-1 and 20-1 gear ratio; speeds 20-120 R. P. M. Speed reducer unit may be purchased separately.

2. *Knock-Out* KEYLESS DRILL CHUCKS

No more drills ruined by slipping! This fast-positive-self-energising chuck tightens in proportion to work load. Releases with finger-tip pressure. Ideal for production or tool room. Five sizes, 0 to 7/8" capacity.

3. *Knock-Out* WHEEL DRESSERS

Scrubbing action of this abrasive wheel dresser does better job with minimum material removed. Ruggedly built with hardened hub and adjustable centers—wheels simple and inexpensive to replace. Four sizes.

4. *Knock-Out* EXPANDING MANDRELS

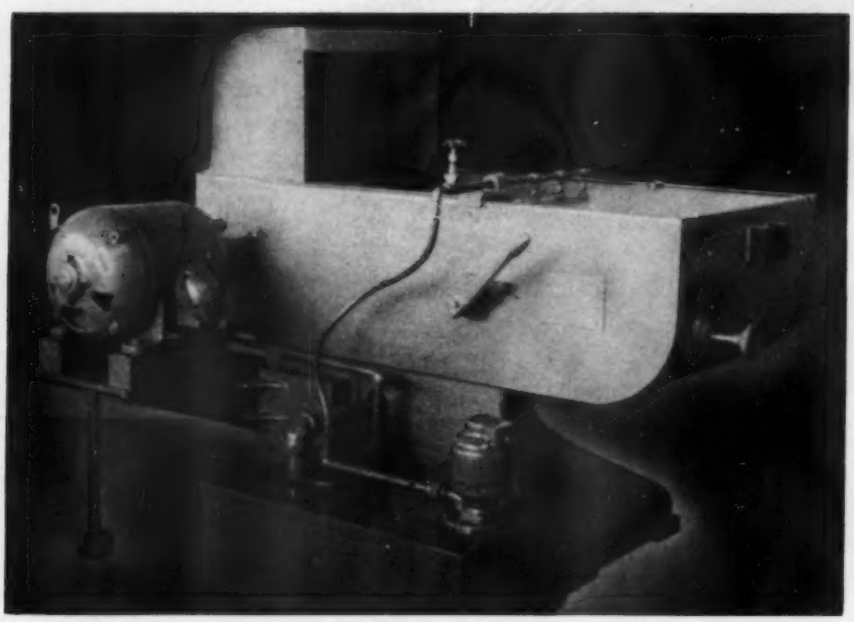
One-piece expanding sleeve holds firmly, accurately, on milling, turning, grinding operations. Quicker, easier to use; five mandrels cover 3/8" to 2-½". Other sizes up to 5½".

5. *Knock-Out* UNIVERSAL TOOL GRINDER

Universal grinders, carbide grinders, and chip-breaker grinders. Models and sizes to fit every shop, large and small. Simple to operate, accurate, ruggedly built for long service.

See Your Nearest Mill Dealer or Write to

K. O. LEE CO.
ABERDEEN, SOUTH DAKOTA

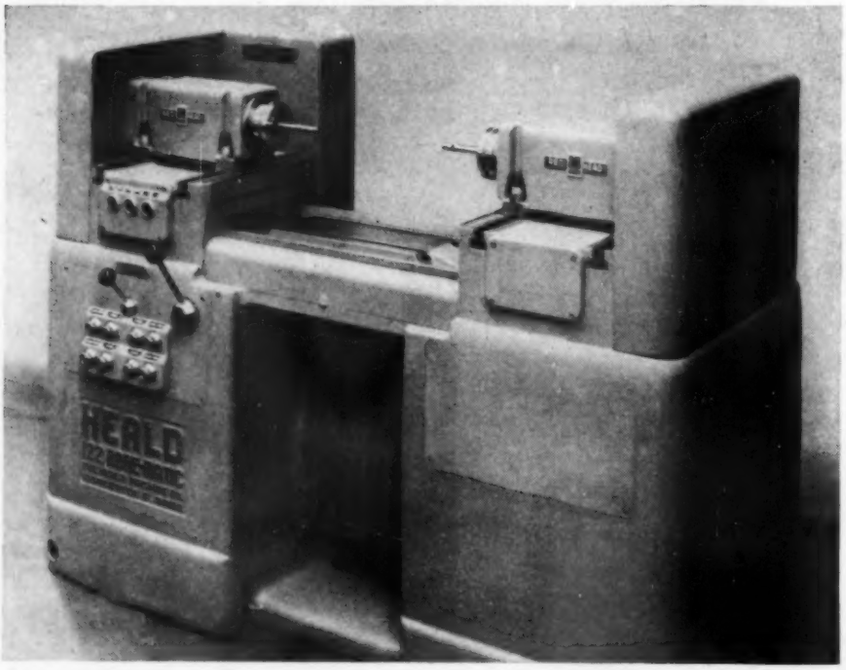


Production Machine's Surfacer Grinds Plastics, Steel, Rubber

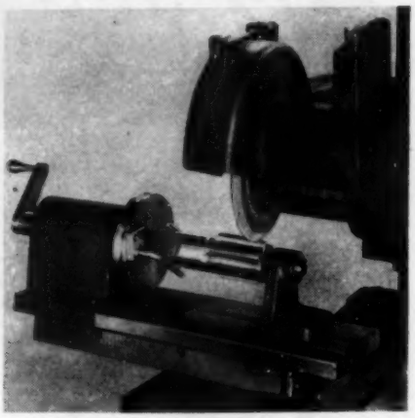
Production Machine Co., Greenfield, Mass., announces a wet or dry belt surfacer, the 20-in. Peerless horizontal belt surfacing machine. Working surface of 20x30 in. is said to allow oscillation of large parts, providing less lost time for belt changing. It is used for flat surfacing die castings, plastics, steel, tile, rubber, glass, fiber and other materials.

A centrifugal pump is mounted in a tank having a 32-gal. capacity. The main drive motor is 10 hp., 1200 rpm., with magnetic starter and pushbutton control. The machine is 61¼x86⅜ in. and weighs 2600 lb.

Belt surface speed on the unit is 4600 fpm. standard. A hinged hood-type guard controls spray. Illustration shows coolant pump and tank and direct motor drive.



BORE-MATICS, double-end Model 122 (illustrated) and single-end Model 121, are designed for small work and arranged to be operated from a sitting position. Made by The Heald Machine Co., Worcester 6, Mass., they perform same type of work and are similar to Bore-Matic Models 222, 322, 221, and 321 (AM, Nov. 20, 1947. p. 149). Bridge width on both models is 16-in. Model 122 has 12-in. max. table travel and 2500-rpm. max. boringhead speed. Model 121 has 8-in. max. table travel and 4000-rpm. max. boringhead speed



H. E. Tinker's Thread Grinder Cuts Threads Any Desired Shape

Tinker's Thread Grinder Co., 169 Granby Rd., South Hadley Falls, Mass., announces a unit for grinding threads of any shape. It can be held on the magnetic chuck of any standard-make surface grinder. Max. dia. that can be ground is 4 7/16 in. Max. travel of slide is 3⅛ in., and max. length between centers is 8 in.

A 4-in. sine bar on the end of the base is used for setting the helix angle of a thread. The tailstock center is adjustable to compensate for any error in work or if taper on work is required.

The crank is attached to a master leadscrew which in turn is directly connected to the live, ball-bearing-center faceplate. The leadscrew runs through a bronze nut screwed onto the upright end of stationary base. The work is rotated by the faceplate and dog. As the leadscrew is revolved by turning the crank, the form dressed on the wheel is ground in the work at desired pitch.

Circular form cutters requiring radial relief can be ground with a specially made leadscrew and nut, depending on the relief angle and diameter. The slide can be locked for grinding straight circular work or special forms.

The chamfer on taps can be backed off by using a straight shaft and cam in place of leadscrew and nut. Another cam affair sharpens counterbores, step drills and countersinks, provided that a center hole remains.

"IT WOULDN'T PAY US TO MISLEAD YOU!"

SPEED CASE STEEL x1515

LOW CARBON OPEN HEARTH FOR CARBURIZING

IS NOW PROFITABLY SERVING OVER 300 OF OUR CUSTOMERS. It will do the same for YOU.

We told them the facts about *Speed Case Steel.*
We sent samples and a Production Expert to show them how to use *Speed Case* in their own plants.

IN EVERY INSTANCE SPEED CASE STEEL...

SPEED TREAT STEEL
Medium High Carbon for Heat Treating

Increased Production . . . Lowered Costs . . . Minimized Rejections . . . Improved Product . . . Replaced Multiple Stocks B1112, C1113, C1117, C1118, C1016, C1017, C1018 and C1019 . . . Why not test *SPEED CASE* in your plant?

DO THIS AT OUR EXPENSE... Write us for samples of Speed Treat and Speed Case Steel. Our Production Expert will follow them to your plant and make his demonstration. Investigate SPEED CASE . . . you can't lose!

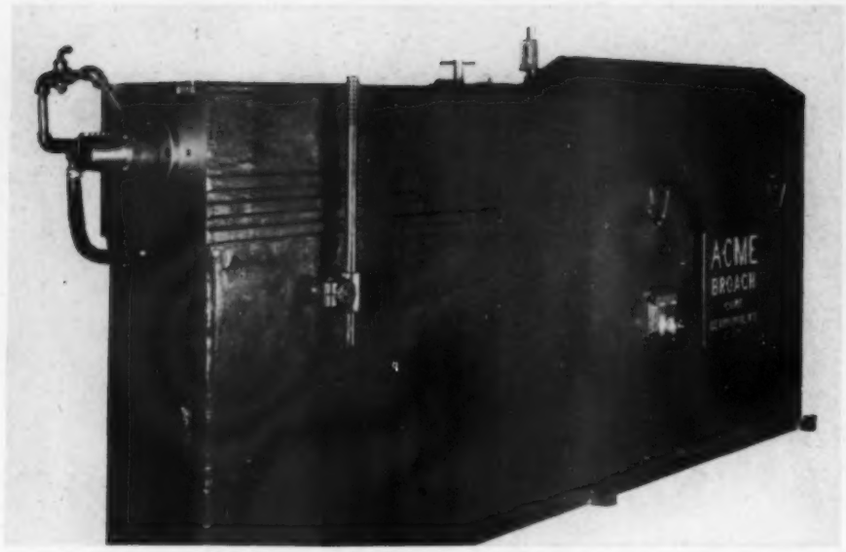
ACTUAL PHOTOGRAPH
Speed Case Steel (.20 carbon) 1 inch cold drawn bar tied in a knot, cold, without fracture.

Tear off here ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

Licensor
MONARCH STEEL COMPANY
HAMMOND · INDIANAPOLIS · CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

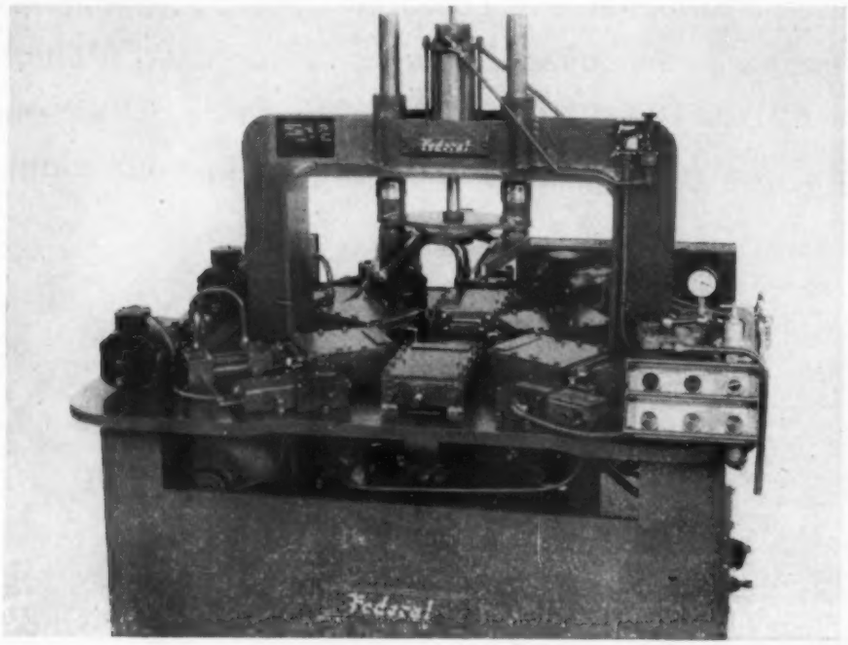
The Licensee for Eastern States
FITZSIMONS STEEL COMPANY
YOUNGSTOWN, OHIO



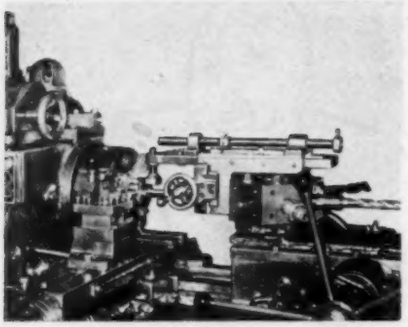
Two Horizonal Broaching Machines Made With 36-in. Stroke by Acme

Acme Broach Corp., Lexington 21, Ky., announces H-4T-36S horizontal broaching machine, manufactured in 4-ton 36-in. stroke and 2-ton 36-in. stroke capacity. The machine is totally enclosed. The puller slide is fitted with adjustable take-up liners sliding on hardened and ground ways. The pull bolt that receives the broach puller is provided with a tightening nut that is said to eliminate lost motion and broach breakage formerly caused by backlash.

Inspection of the motor, hydraulic pump and control valve, as well as the complete hydraulic unit, can be made by opening the hood at the back of the machine. The machine is equipped with dual cylinders, the main pulling cylinders being directly in line with the faceplate bore of the machine. A high-speed return cylinder is mounted just above the main cylinder and is used only for returning the pulling slide to the front or starting position.



TRIPLE-HEAD PROJECTION welder, for mounting brackets to cooling fins on compressor assemblies, is announced by Federal Machine and Welder Co., Warren, Ohio. The machine produces 150 assemblies per hr., with a machine-cycle time of approximately 5 sec. It is equipped with 150-kva. transformer



REEVE TURRET attachment is made by Artesan Tool and Cutter Co., 521 Vester St., Ferndale 20, Mich. New model is said to simplify boring of tapers and profile holes with any turret lathe and hand screw machine. The attachment is set to any diameter, and the taper is said to be completed in 1 min.

Keene Valley's Micrometer Stop Speeds Stock-Length Correction

The KVE micrometer stop is designed to eliminate trial-and-error methods in making screw-machine setup adjustments. It is manufactured by Keene Valley Engineering Co., Homer, N. Y. A micrometer dial caps one end. The bolt at the other end is turned to conform to any adjustment made by turning the dial. Correction of stock length can be made to 0.001 in. It is available in shank dia. of ¾, ⅝ and 1 in.

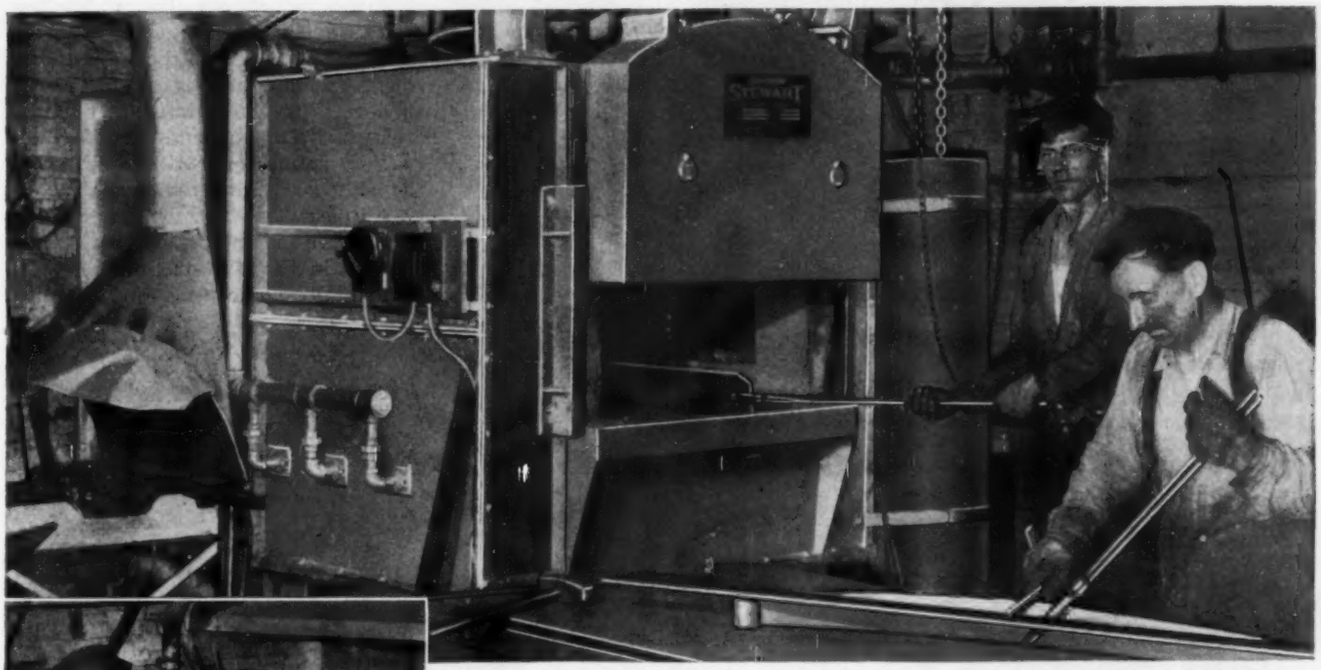
FLEXIBLE HANDLES for small diameter thread gages are all metal. Made by Lincoln Park Industries, 1719 Ferris Ave., Lincoln Park 25, Mich. They are said to provide flexibility which reduces pressure on gage member and minimizes hazard of breakage. Flexible handles can be supplied in place of solid handles on Lincoln Park thread gages to No. 10 machine-screw size

No. 77 of a Series of Typical Installations

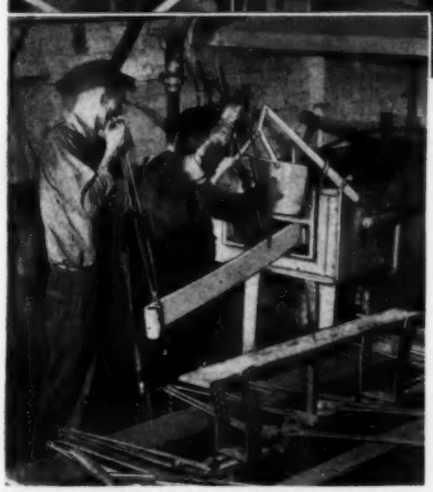
Sunbeam
STEWART
THE BEST INDUSTRIAL FURNACES MADE

For REPAIRING and FABRICATING HEAVY-DUTY SPRINGS

AT ATLAS AUTO SPRING CO., BROOKLYN, N. Y.



Unloading the Standard Sunbeam Stewart Heavy Portable Oven Furnace in use at Atlas Auto Spring for heat treating heavy-duty spring leaves. Designed for 1400°-1800° F. operation, these units are also available for operation up to 2200° F.



For over 16 years, Atlas has been using this Sunbeam Stewart Forge Furnace as a supplementary shop furnace. Its simple, yet highly efficient design required little maintenance through the years—another example of Sunbeam Stewart's high quality furnaces, incorporating correct design and good workmanship.

Specializing in repair and replacement of heavy-duty leaf springs used on semi-trailers, milk and oil tank cars, coal trucks, etc., Atlas required the most accurate heat treating equipment for their fabrication. Using a standard Sunbeam Stewart Semi-Muffle Heavy Portable Oven Furnace, they have produced springs with enough flexibility to absorb road shock, yet rugged enough to withstand the fatigue of abnormal deflections.

Close temperature control and even heat distribution throughout the entire heating chamber is made possible by the Sunbeam Stewart design.

The large door opening—the entire width of the furnace heating chamber—facilitates loading and allows the heat treating of large assemblies. The usable hearth area is 18 sq. ft.

The installation at Atlas was designed for 1400° to 1800° F. operation. However, these furnaces are available for operating temperatures up to and including 2200° F.

This installation demonstrates the versatility of standard Sunbeam Stewart Furnaces. In addition, Sunbeam Stewart builds completely automatic units to meet specific production requirements.

SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION of SUNBEAM CORPORATION
(*Formerly* CHICAGO FLEXIBLE SHAFT CO.)

Main Office: Dept. 119, 4433 Ogden Ave., Chicago 23 — *New York Office:* 11 W. 42nd St., New York 18 — *Detroit Office:* 308 Boulevard Bldg., Detroit
Canada Factory: 321 Weston Rd., So., Toronto 9

A letter, wire or 'phone call will promptly bring you information and details on SUNBEAM STEWART furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a SUNBEAM STEWART engineer will be glad to call and discuss your heat treating problems with you.

Parts and Materials

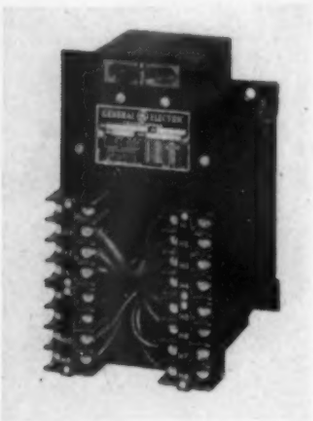
AIR COMPRESSOR, Model 100, is 1 hp., operates at 1200 rpm., and has 5.00-cfm. displacement. Made by Bristol Machine Tool Co., 913 Wood St., Bristol, Pa. It can be used for ¾- and ½-hp. at proportionately reduced speeds. Unit is twin-cylinder, single-stage type, air-cooled by fan flywheel

O'Connor Electronic Handyman Features Photoelectric Control

A photoelectric control device is introduced by John T. O'Connor & Co., 190 South Valley Rd., West Orange, N. J. The device will measure light intensity and act as a switch, and it can be used as combination counter or meter.

The internal arrangement provides for filters for color or infra-red operation. A 2-in. dia. light-gathering lens together with a directional internal optical arrangement makes possible various gaging, measuring, and controlling applications in one unit without the use of a sensitivity adjustment.

With suitable additive mechanisms the Handyman will start and stop machinery, throw protective beams of light in front of press or jaw, and detect fire and smoke.



Line of GE Transformers Made For Machine-Tool Applications

Specialty Transformer Div., General Electric Co., Schenectady 5, N. Y., announces a line of machine-tool transformers. Ten ratings from 0.075 to 3 kva. for use on 60-cycle circuits provide a large part of domestic machine-tool transformer requirements.

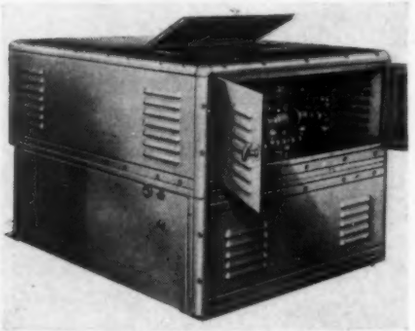
For 25-cycle applications these transformers are listed in four standard sizes from 0.150 to 0.500 kva. To complete the line, an all-purpose group rated for both 50- and 60-cycle supply circuits is provided.

Terminal board of molded plastic facilitates wiring. A built-in overload protector with time-delay action prevents damage to the transformer due to overload or accidental short circuit.

Nickel-Nickel Moly Thermocouple Stays on Calibration at 2100 F.

A nickel-nickel moly thermocouple which will stay on calibration in reducing atmospheres at temperatures as high as 2100 F. has been developed by Industrial Heating Div., General Electric Co., Schenectady 5, N. Y. The thermocouple element, supported by ceramic insulators, is enclosed in a special alloy protection tube which is welded at the hot end to make it air tight. A gas-tight adapter is welded to the tube at the terminal end, and is screwed onto a 1-in. pipe which is welded to the steel furnace. The addition of a terminal connector with a die-cast housing completes the assembly.

Applications include measuring temperatures in protective atmospheres in the heat-treating of steel and malleable iron.



Vickers Hydraulic Power Units Custom Built to Requirements

Vickers Inc., 1410 Oakman Blvd., Detroit, Mich., has announced custom-built hydraulic power units designed for special installation requirements. They can be built to include all of the necessary valves, pumps, motors and piping in one self-contained unit. All hydraulic components are centralized for operating adjustment.

McBeth Pressure Lubri-Cleaner Applicable for Foundries, Plants

A pressure Lubri-Cleaner for use in rolling mills, hammer and forging plants, and other industrial organizations, has been announced by McBeth Machinery Co., 1109 Grant Bldg., Pittsburgh 19, Pa. Lubricating as it cleans, the Lubri-Cleaner is said to eliminate rusting under conditions of dampness.

How We Beat Rising Costs by Changing to Welded Design

By Francis M. Wick, General Manager
Silver Manufacturing Company, Salem, Ohio

DESPITE the fact that costs have greatly increased in the past two years, the material costs of our "Ohio" Feed Cutter (Fig. 1) are no more today than on V-J day, due to the savings we have gained by changing to welded steel design.

The change to welded steel has also cut the machine's weight 24%, from 455 to 345 pounds—really a price decrease, since most of our sales are to foreign customers who pay duties assessed on basis of weight.

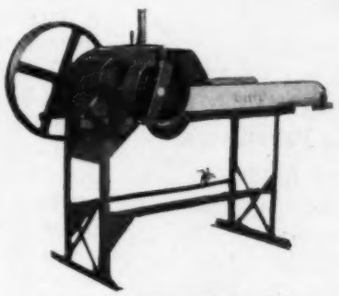


Fig. 1. The "Ohio" Feed Cutter.

We originally started experimenting with welded steel design because of the difficulty of getting a regular flow of parts. Our welding department has not only eliminated production bottlenecks, but has enabled us to increase production 79% with only a 20% increase in employees. The chief reason for this is that the parts of welded steel require much less machining, grinding and fitting than the former material. The same man-hours we formerly put into finishing now are used to prepare raw materials for the welding department and handle all finishing.

An example of cost reductions on the individual parts is the hood (Fig. 2). The hood made by the former method cost $1.99. We now fabricate it from three pieces of 12-gauge mild steel, flame-cut and brake-formed, for 94.3 cents, a saving of 52½%. Weight is also cut in half, from 17 to 8.5 pounds.

One of the interesting changeovers to welded design is the corrugated roll and shaft (Fig. 3). Weight was reduced from 18.5 to 11 pounds. The corrugated roll is now made of twelve angles, ⅛" x 1" x ⅝". Six of them at a time are inserted in a special jig and tack-welded together to form a half cylinder. The end discs, stamped from 12-gauge sheets, are slipped over the shaft and held in position for welding in a cradle-type jig. Then, using another special jig, the two corrugated halves are tack-welded to the discs. Tack welds give sufficient strength.

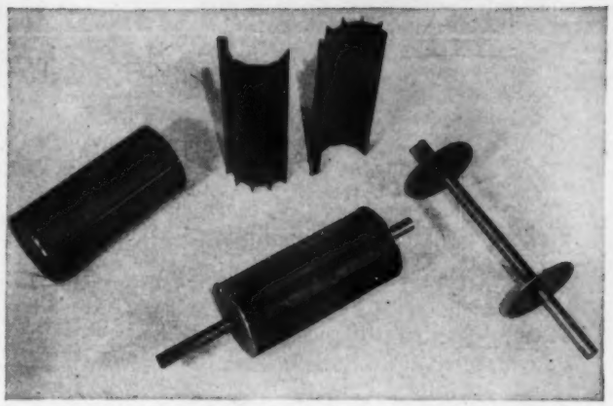


Fig. 3. At left is former corrugated roll. New welded roll and shaft (center) are fabricated from steel shapes as shown.

Welding the shaft and roll as an integral unit eliminates the man-hours formerly spent in machining and broaching keyways—a troublesome job.

In redesigning the flywheel (Fig. 4), weight was removed from the center, where it has a low moment of inertia, and concentrated on the rim, where it has the best effect. Thus the welded steel flywheel weighing 56 pounds has the same efficiency as the former design of 72 pounds.

The flywheel O.D. is 24". The rim is a 2" x 1¼" mild steel bar approximately 6' long which is heated, rolled and welded. Spokes are 3/16" x 2½" bars, drilled and broached at the center to match the hub of cold drawn tubing spaced between them. Welding is done in a jig which has a center post to hold the spokes and tubing in alignment, and three jaws which center the rim around the spokes. Each spoke is welded to the rim with a single pass, and two large tack welds join the hub to the spokes.

Other parts we have converted to welded design are the side plates, pulleys and smooth roll. The frame, formerly bolted, is now arc welded. All welding is done with "Fleetweld 7" electrode.

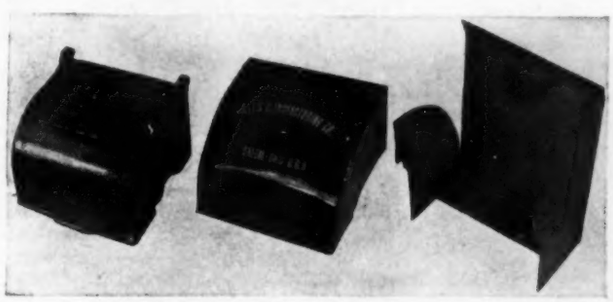


Fig. 2. Welded steel hood (center) costs 52% less than former design (left). How welded hood is made is shown at right.

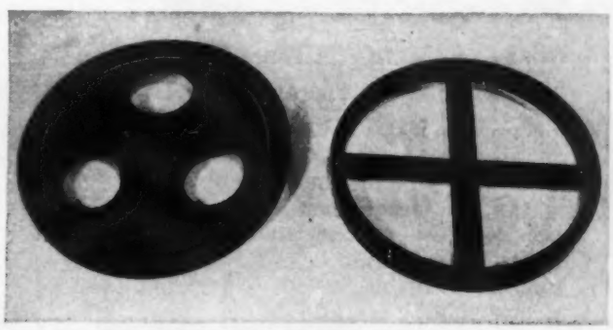


Fig. 4. The old flywheel was replaced by welded design (right) which weighs 23% less, but is just as efficient.

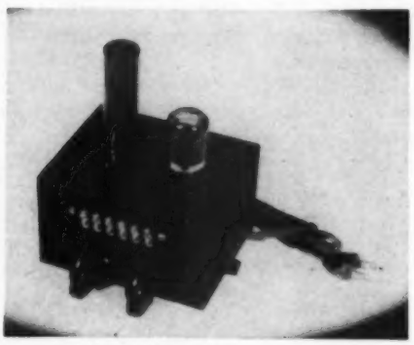
The above is published by LINCOLN ELECTRIC in the interests of progress. Machine Design Studies are available to engineers and designers. Write The Lincoln Electric Company, Dept. 2211 Cleveland 1, Ohio.

Vickers Hydraulic Transmission Developed for Variable Speed

The Machinery Equipment Div., Vickers Inc., 1410 Oakman Blvd., Detroit, Mich., introduces a variable-speed hydraulic transmission for fractional-hp. machinery drives.

Features include stepless speed adjustment from zero to maximum output rpm. in either direction of rotation. Full and constant torque-power characteristics are said to be maintained throughout the entire speed range. The input shaft can be driven in either direction without mechanical change.

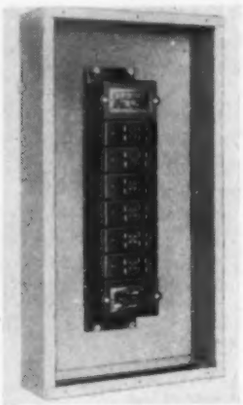
The Vickers TR2-R13F13 transmission is rated at ½ hp., continuous duty. Fingertip speed adjustment over complete range is obtained by handwheel or servo control.



Wilson's Repeat-Cycle Timer Designed for Process Control

G. C. Wilson & Co., 2 N. Passaic Ave., Chatham, N. J., announces an electronic repeat-cycle timer for process control, life testing and laboratory use. Independently variable on and off intervals ranging from 0.1 to 4.0 min. are available. Wide variations in line voltage are said to have an effect of less than 1% on the timing intervals.

Means are provided for synchronizing, the timer cycle with other equipment. Relay contacts having up to two transfers (double pole, double throw) each rated for 10 amp. at 115-v. ac. can be provided. Timer is housed in a 3x4x5 in. chassis. Timers for operation from 115-v. dc. can be provided.



Square D's Plug-In Panelboard Employs Coilless Magnetic Trip

A plug-in panelboard with thermal-magnetic multi-breakers, is made by Square D Co., 6060 Rivard St., Detroit 11, Mich. Due to the small size of the MO4 Multi-breaker units, the panel affords increased gutter space: 5½-in. gutters in 15-in. wide panelboard. The column-type design is said to provide twice the number of circuits previously available in cabinets of similar size. The plug-in feature permits easy removal or insertion of Multi-breaker units for changes in ratings or additional circuits.

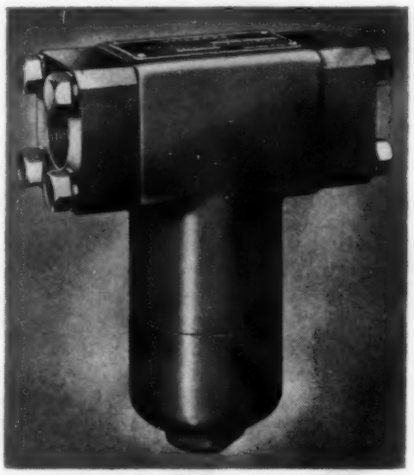
The units are mounted on silver-surfaced buss bars by means of positive-pressure contact jaws. The high-speed, coilless magnetic and thermal trip of the MO4 breaker gives adequate time lag for starting motors and tungsten-lamp inrush currents. NMO panelboards are available in 100- and 200-amp. mains ratings, 120/240-v. ac. with 15, 20 and 30 amp. branch circuits.

GILMAT FOOTSWITCH has silver contacts enclosed in molded bakelite. Top and base are heavy cast aluminum with a non-slip rubber base. Capacity 1250 w. Handles 10 amp. at 125 v., or 5 amp. at 250 v. Harrison Mfg. Co., 7221 Hocker Ave., Merriam, Kan.

Zurn Angle-Construction Strainer Made for Close Tolerance Units

A strainer designed with an angle construction has been developed by J. A. Zurn Mfg. Co., 1801 Pittsburgh Ave., Erie, Pa. Commonly used with pumping equipment and other close tolerance units, it may be installed directly upon the unit.

The strainer can be used at any point in a pipe line, where it can serve as or replace a right-angle connection. Various types are made with pressure ratings of 125, 150, 250 and 300 lb.



Proportional-Type Oil Filter Incorporates Venturi Design

A proportional-type oil filter using a venturi design is announced by Vickers Inc., 1410 Oakman Blvd., Detroit, Mich. The design features a cartridge which filters out particles down to two microns in size.

Reversible filtering action meets the requirements of closed circuits. The venturi action in the filter controls maximum pressure built up across the cartridge, eliminating the use of a by-pass valve. Maintenace requirements are said to be limited to periodic replacement of the cartridge.

PORTABLE HORIZONTAL DRILLING and TAPPING MACHINE

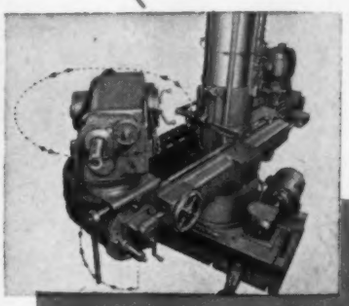
NEW *Featuring Compound Head Movement*

DRILLS, TAPS and SPOT FACES

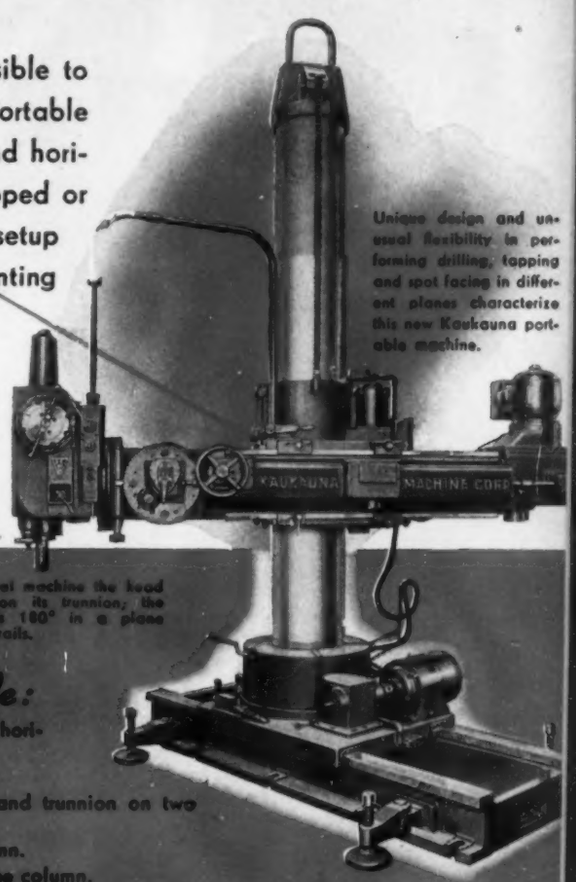
MULTIPLE SURFACES IN A SINGLE SETUP

Through compound swivel movement of the machine head, it is possible to position tools in any conceivable angle with the **new** Kaukauna Portable Horizontal Drilling and Tapping Machine. Thus, angular, vertical and horizontal surfaces of any casting or weldment may be drilled and tapped or spot faced. In many instances, it is necessary only to make one setup because of the flexible machine movements which simplify presenting the cutting tool to the work.

Only one setup is required to complete all drilling, tapping and spot facing operations on this casting.



On this universal machine the head rotates 360° on its trunnion; the trunnion swivels 180° in a plane parallel to the rails.



Unique design and unusual flexibility in performing drilling, tapping and spot facing in different planes characterize this new Kaukauna portable machine.

These movements include:

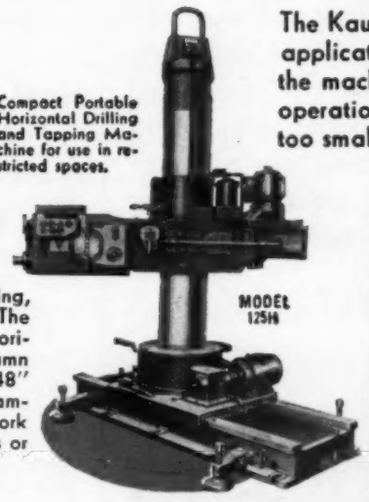
1. Complete rotation of the head in either the horizontal or vertical plane.
2. 180° swivel of the head on its trunnion.
3. 24" horizontal adjustment of the head and trunnion on two sliding rails.
4. Complete rotation of head, rails and column.
5. Vertical movement of head and rails on the column.
6. Traverse movement of the complete column assembly on its runway.

With these motions, limitless new drilling and tapping possibilities are opened by the new machine.

Heavy Duty Portable Drilling and Tapping Machine with tilting head. Performs many types of machining operations.

MODEL 1030

Kaukauna Model 1030 performs all types of drilling, reaming and tapping operations "on the spot" and practically at any angle. Progressively ahead in versatility, Model 1030 also performs drilling, tapping, chamfering, facing, -threading and other operations. The headstock tilts 45° above and below the horizontal and traverses vertically 48". The column rotates 360° and also traverses laterally 48" . . . all movements powered. Spindle 3" diameter, travels 24". Ideal for production line work requiring miscellaneous machining operations or during the assembly of heavy equipment.



Compact Portable Horizontal Drilling and Tapping Machine for use in restricted spaces.

MODEL 125H

The Kaukauna Model 125-H machine is better suited to individual applications where the range of performance is secondary. Because the machine is very compact in design, many drilling and tapping operations can be completed in restricted and cramped areas too small for the Model 125-U

COMBINATION INDEXING AND STATIONARY TABLE

gives you

1. Increased working range for many types of machine tools.
2. Single or multiple work settings at any location.
3. Fast, accurate indexing of work for consecutive operations.

For machining operations, inspection and layout work, this 3' x 6' x 28" high, convenient indexing and stationary table permits a profitable increase in work range. T-slots are provided on top and end surfaces, permitting the table to be used as an angle plate.

KMC *Kaukauna* MACHINE CORPORATION
KAUKAUNA, WIS., U.S.A.

Send Now FOR FREE CATALOG
descriptive of profit producing Kaukauna Machines and Indexing Table.

HOFFMAN *Fully Automatic*
FLOTATION EQUIPMENT

Saves "Down Time"

Boosts Production

Lengthens Wheel Life

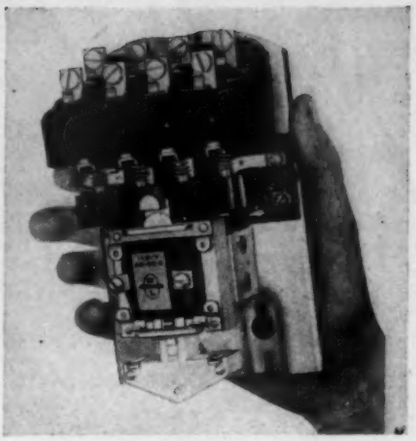
Pays for Itself

A marvel of truly automatic convenience, the Hoffman Flotation unit clarifies soluble oil and water coolants by means of a unique and exclusive principle. No filter aids to add or change—no screens to plug—no need for constant maintenance. Dirty coolant enters a tank and is aerated by a rotor-stator. Waste solids are held in suspension by froth and skimmed off automatically. Clean coolant, of exceptional clarity, is continuously spilled into a reservoir for return to machine tools.

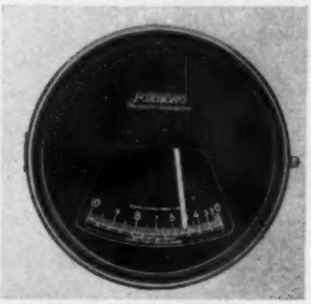
GET FULL DETAILS AND A FREE SURVEY

For increased machine tool productivity—longer wheel life and reduced maintenance, investigate Hoffman Flotation Equipment. Standard sizes with flow from 20 to 1,000 gallons per minute. Larger sizes available. Write today.

U. S. HOFFMAN MACHINERY CORPORATION
211 Lamson St., Syracuse, N. Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE



SOLENOID CONTACTORS, size 1 ac., are used as mainline, reversing or accelerating contactors on ac. motor controllers for machine tools, air-conditioning equipment, pumps, and compressors. Made by Ward Leonard Electric Co., Mount Vernon, N. Y. Available with up to four main poles, with maximum ratings of 7½ hp., 440 to 550 v. on 3 phase, 60 cycles

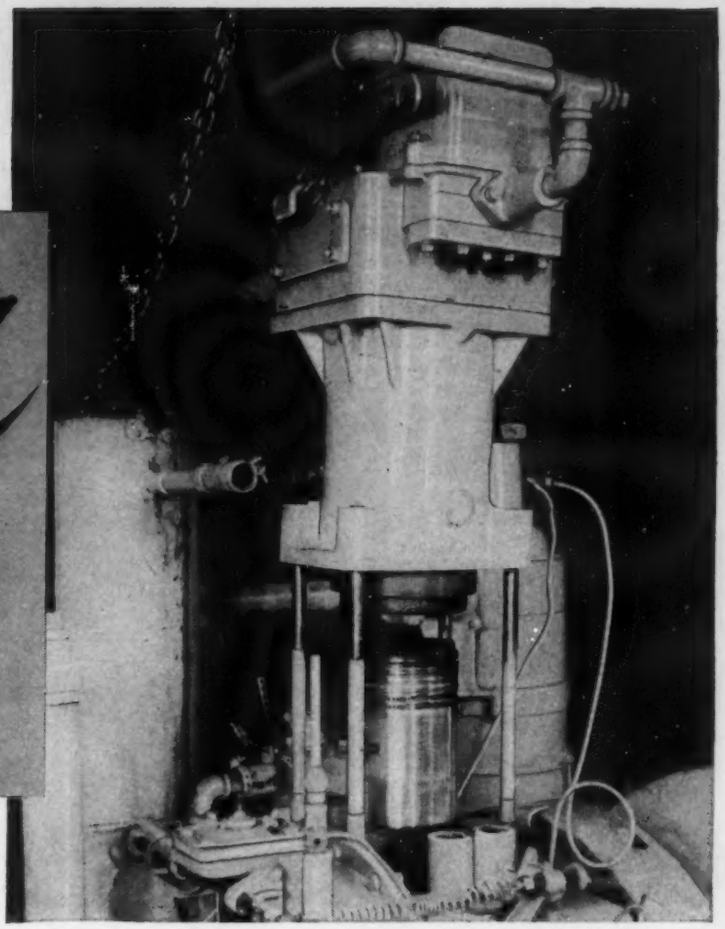


TRANSMITTER, Model 42, for use in the pneumatic transmission of measurements such as flow, static or differential pressure, liquid level, temperature or humidity, is made by The Foxboro Co., Foxboro, Mass. It is an indicator-type instrument, available with either an eccentric or concentric scale

Eronel Plastic Thermo-Dip N.S. Protects Machine Tools, Gears

Eronel Industries, 5714 W. Pico Blvd., Los Angeles, Calif., introduces Thermo-dip N.S., a hot-melt compound for protecting tools, cutting gears and other parts from corrosion, abrasion, shipping and handling. It is a new member of the Thermo-dip series, possessing a higher tensile strength, greater elongation and slightly lower melting point. It is said to be resistant to salt water, high humidity and low temperature, and to maintain its flexibility and properties over extended periods. It is removed by stripping and can be reused.

Clean ... FROM EAST CHICAGO



At Sinclair Research Laboratories, East Chicago, Ind., skilled technicians specialize in keeping it clean ... for you.

With today's accent on the detergency qualities of engine lubricants, Sinclair Research is constantly making tests to determine the cleansing properties of motor oils, diesel lubricants, and other products, using the special "come-apart" single cylinder diesel engine shown above.

Such tests—duplicating actual operating conditions—constitute an essential part of Sinclair's outstanding research, which has resulted in the development of ever finer petroleum products for over 30 years. At its soon-to-be-completed new Research Center, Harvey, Ill., Sinclair will continue to develop industrial and automotive lubricants of outstanding performance with greater facilities, finer equipment, and more highly skilled personnel than ever before.

Sinclair
Metal Cutting Oils
(Embodying Film Strength Characteristics)
ORDNANCE OILS
Permit deeper cuts at higher speeds

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SINCLAIR
Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

DESIGNED to deliver the GOODS

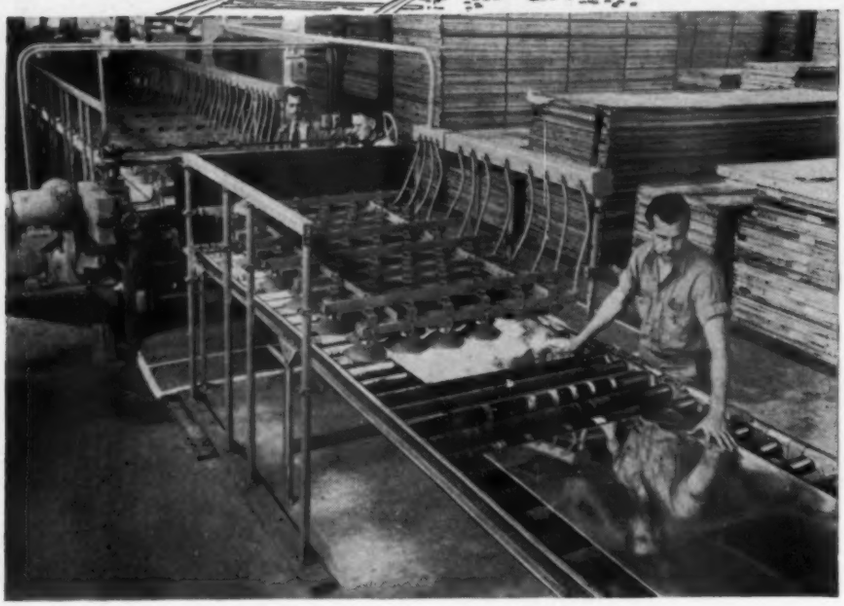


Photo — Courtesy Consolidated Vultee Aircraft Company

STANDARD CONVEYOR COMPANY is able, through long experience, to specify and build for a diversity of handling needs . . .

On your next conveyor need — large or small, a section, a system, a portable conveying or piling unit—check with Standard, builders of an unusually wide variety of conveying equipment: power and gravity conveyors in belt, roller, chain, slat and push-bar types, portable units, spiral chutes, pneumatic tube systems.

The range and versatility of Standard Conveyor equipment is the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. The benefit of this experience is available to you, without obligation.

The counsel of Standard Conveyor engineers is valuable in deciding on the right kind of conveying equipment to "Deliver the goods" faster—at lower cost. *Write for comprehensive reference book — "Conveyors by Standard" — Catalog No. AM-127.*

STANDARD CONVEYOR COMPANY
General Offices: No. St. Paul, Minn.

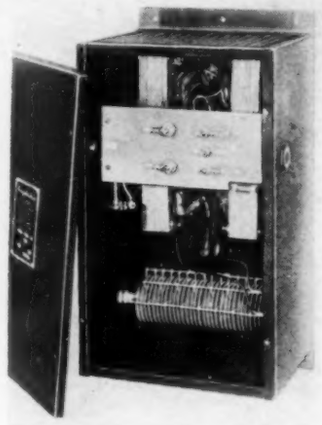
Standard
GRAVITY & POWER
CONVEYORS

SEE STANDARD'S EXHIBIT
BOOTHS 508 & 607

2ND MATERIALS HANDLING EXPOSITION
CLEVELAND JANUARY 12-16, 1948

GE's All-Welded Solenoid Used Where Powerful Pull Is Needed

General Electric Co., Schenectady 5, N. Y., announces a small all-welded solenoid for use where powerful pull is needed in a small space, such as in appliances and safety devices. It develops a maximum pull of 0.26 lb. in a ½-in. stroke, and operates on 110 v. 60 cycles. Welding of frame laminations reduces eddy current losses since the welds are outside the magnetic-flux path.



La Marche Selenium Rectifier Maintains Constant Voltage

A selenium rectifier said to maintain constant voltage regardless of the changing amounts of current drawn from it has been announced by La Marche Mfg. Co., 6525 Olmsted Ave., Chicago 31, Ill. It is designed to handle gangs of low-voltage dc. magnets in varying loads from 0 to 20 amp. with no variance in voltage. The dc. voltage control maintains or increases starting voltage until full amperage has been drawn from the rectifier.

Occupying a cubic foot of space, the rectifier is a full-wave bridge type suitable for any ac. frequency and a line voltage of 115 to 230 v.

Parker Metal-Cleaner Line Available in Three Classes

Parker Rust Proof Co., Detroit, Mich., announces a line of metal cleaners available in three classes: for steel, zinc, and aluminum. They include emulsion types, acid types, and alkaline dies. They are formulated to make hard water suitable for cleaning, to remove soil from metal surfaces, to condition them for Bonderite coatings, and to remove rust and grease prior to painting.

Now! MORE THAN *600* CARBOLOY® STANDARDS

CEMENTED CARBIDE

. . . FOR MAXIMUM RESULTS WITH CARBIDE TOOLING

. . . OVER 80 STANDARD TOOLS!
for general purpose use.

One of 11 standard sizes

. . . OVER 60 STANDARD BORING TOOLS!

two of the 7 styles available

. . . OVER 180 STANDARD BLANKS!
for cutting tools.

A few of the many shapes available

. . . OVER 300 STANDARD WEAR—RESISTANT BLANKS!

typical examples of available shapes

Looking for ways to increase production . . . to reduce manufacturing costs . . . to meet and beat Today's competition.

HERE'S THE ANSWER . . . get greater carbide tool effectiveness . . . with the greater advantages you get in low-cost Carboloy "Standards."

More than 600 Carboloy "Standards" . . . cutting tools and blanks . . . ready for instant use . . . are "on-the-shelf" . . . stocked for *speedy delivery* by local distributors in 74 cities coast-to-coast. Why not look into the unusual benefits in Carboloy Cemented Carbides . . . get maximum results through greater carbide tool advantages.

Have you seen the *New* 1948 Carboloy Tool Catalog—just published? This 64-page illustrated catalog . . . most comprehensive in the cemented carbide industry . . . is literally packed with cost-cutting "Standards" and their applications . . . a veritable abundance of Carboloy Cemented Carbides to handle 60%—80% of your machining needs. Send for your FREE copy TODAY!

Carboloy Company, Inc.
11149 E. 8 Mile Street, Detroit 32, Michigan

AUTHORIZED CARBOLOY CEMENTED CARBIDES DISTRIBUTORS

Standards are stocked in 74 cities coast-to-coast

CARBOLOY

CEMENTED ® CARBIDES

Wipe Out

OVERLOOKED EXPENSE ITEMS *with*

"KEX"

INDUSTRIAL WIPING TOWELS

IN THESE DAYS when it is so necessary to keep operating costs at a minimum, it may be well for you to look into your small expense items that may have been overlooked.

Is "price buying" of scrap rags and waste really wasting money in scratched surfaces on expensive, highly sensitive machinery?

One way to reduce such unnecessary cost is to use KEX National Service from your local authorized distributor. KEX Industrial Wiping Towels are brought to you on regular schedules in any quantity, as you need them.

KEX Industrial Wiping Towels are uniform in size and made from new, soft textured fabrics woven to specification for Industrial use. Edges are bound to eliminate fraying and catching onto machinery. KEX towels are made for wiping. They are not discarded fabrics that have served their purpose in some other capacity. There are no hard seams, no forgotten buttons to mar delicate, sensitive surfaces.

Rent Kex Industrial Wiping Towels and Watch Costs Go Down. Nothing to buy—no expensive inventory—just a low monthly rental. The first month you use this service should show a decided saving on wiping costs.

For complete information, see your classified Telephone Directory for nearest KEX distributor, or write KEX National Service, 295 Fifth Avenue, New York 16, New York.

"KEX" NATIONAL SERVICE

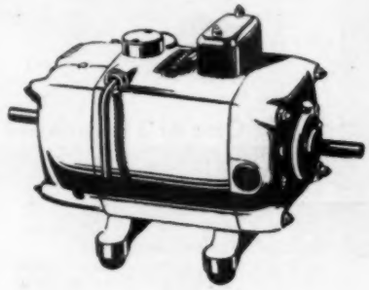
REG. U.S. PAT. OFF.

"KEX" REG. U.S. PAT. OFF. NATIONAL SERVICE A CALLAWAY MILLS PRODUCT INDUSTRIAL WIPING CLOTHS

Ampco Metal Centrifugal Pump Handles Corrosive Elements

A centrifugal pump suitable for handling acids, salts, and other corrosive elements, is available from Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis. Capacities of first models range up to 240 gpm. and the heads to 170 ft. Sizes are 1½x1¼, 2x1½ and 2½x2 in.

The pumps are single-stage, single-section, closed impeller models. Bearing thrusts are relieved by hydraulic balance. The series is available in two types: close coupled and pedestal. The pedestal type permits user to connect any type drive.



Guernet's Variable-Speed Motor Gives Constant Maximum Torque

Guernet Electrical Machinery, Inc., Box 196, Meriden, Conn., announces the Model T variable-speed motor designed to maintain constant maximum torque at all speeds. It is variable from 1500 to 6000 rpm. giving adjustable, stepless speed control. A lever stops and starts the motor and mechanically controls a pair of centrifugal vibrating contacts which accomplish the speed variation.

The motor is 1/5 hp., ball bearing, universal wound, reversible, 115 v., single phase, and is approximately 9x7x5 in. It is also available with single- and double-reduction gears and flexible shafts.

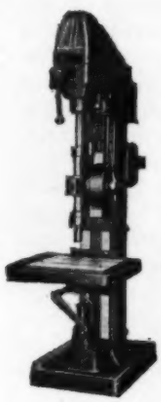
Endless-Type Plastic Belting Created with Borel's Fusite

Jules Borel & Co., Kansas City 6, Mo., introduces a type of plastic belting under the name of Fuse-Ite. An endless belt is created by merely touching the two ends to a properly heated surface and placing them in direct contact.

Designed especially for watchmakers, Fuse-Ite is said to resist temperature extremes and acids up to 20% in strength. It is available in flat, V-belt or round type from 1- to 15-mm. dia.

Avey's PLUS features add up to TOP PRODUCTION

Six speed changes on the AVEY BMA-6 are made through selective, sliding gears. This automotive type of gear shift is controlled by a single lever at front of machine. Provides versatility and effective operation.

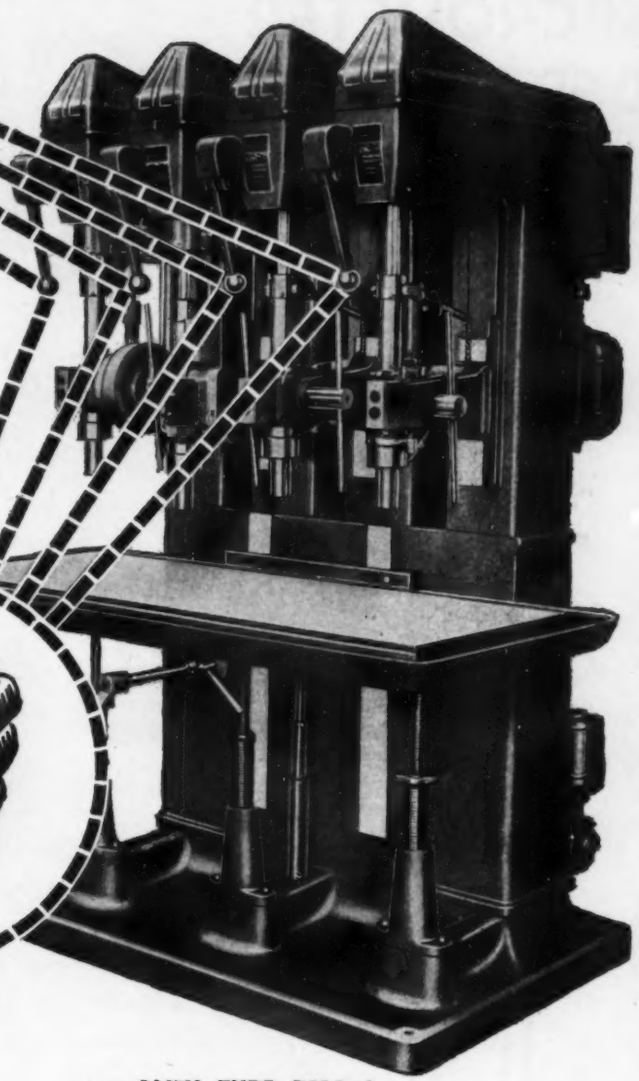


CAPACITY
Cast-Iron

#2 BMA 6-⅞"

#3 BMA 6-1¼"

Single to six spindle machines, equipped with hand feed, power feed or reversing motor tapping.



AVEY TYPE BMA-6
Four Spindle—12" Overhang
1st spindle—Avey-matic feed
2nd spindle—Plain power feed
3rd spindle—Hand Feed
4th spindle—Tapping (reversing motor)

plus FINAL SPINDLE DRIVE—VEE BELTS

Vee belt used on final drive from gear box to spindle. Increases speed and sensitivity in drilling. Carries full horse power from motor to job.

plus STANDARD MOTOR — EACH SPINDLE

Each spindle of AVEY BMA-6 individually motor-driven by standard frame constant speed motor. Foot-mounted motor easily interchanged or replaced. Standard motors can be stocked.

plus SPEEDS OBTAINED — SLIDING GEARS

Selective, sliding gears of AVEY BMA-6 change speeds quickly and easily. Each gear is manufactured and finished by accurate, modern process, shaved, hardened and lapped. Insures smooth operation and long performance.

Avey DRILLING MACHINES
CINCINNATI, OHIO

CLIP AND MAIL TODAY

AVEY DRILLING MACHINE CO.,
CINCINNATI 1, OHIO

Gentlemen: Please send without obligation your new Bulletin 647.

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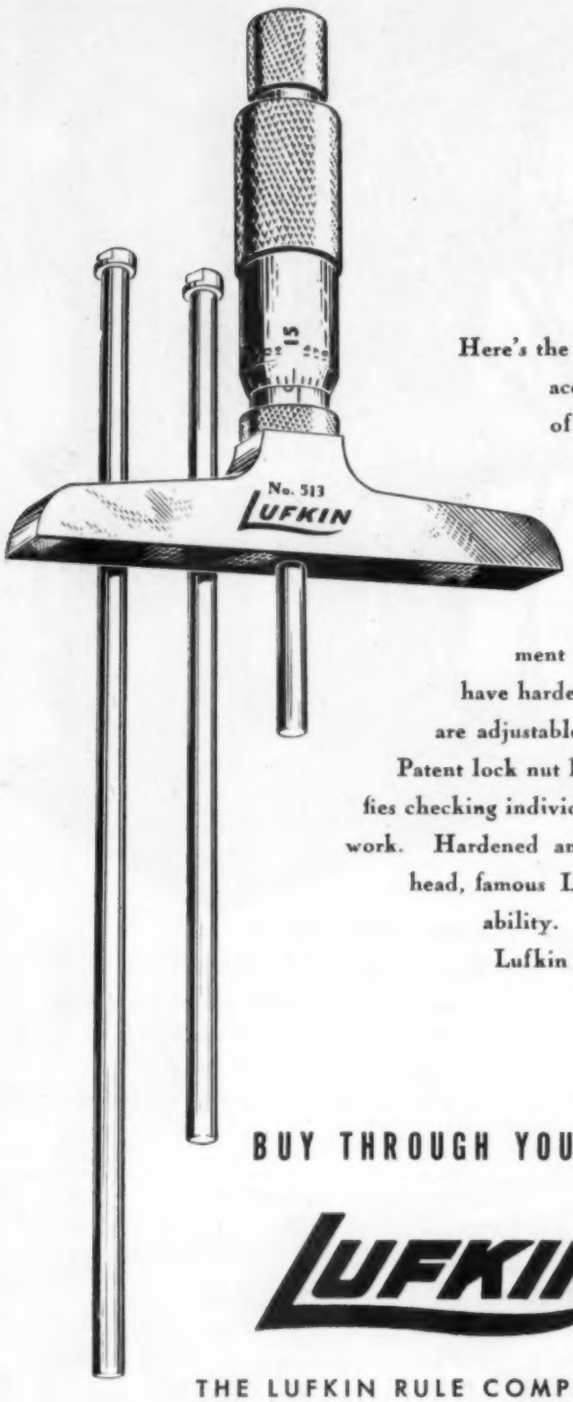
It's easy to be accurate with THE LUFKIN MICROMETER DEPTH GAGE



Here's the finest tool made for easy, accurate depth measurement of holes, slots, counterbores, and keyways. Three interchangeable rods make it easy to take any depth measurement between 0 and 3". Rods have hardened and lapped ends and are adjustable to compensate for wear. Patent lock nut holds the reading, simplifies checking individual pieces on production work. Hardened and ground base, knurled head, famous Lufkin accuracy and durability. Get the best — buy the Lufkin Micrometer Depth Gage. Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR

LUFKIN

THE LUFKIN RULE COMPANY

SAGINAW, MICHIGAN • New York City

ROUND TABLE Discussion

SHOULD THE BOSS GET TOUGH?

Like the slave-whip, a "tough" foreman is a form of intimidation—a poor substitute for an effective personality. The control of men and production is a question of brains, knowledge and self-control—the essentials for leadership. The possession of these is not compatible with the individual whose shout is his nearest approach to strength. In a state of nature, the weaker animals are often frightful in appearance, or they may emit an unpleasant smell. The boss who shouts is taking a leaf out of nature's book.

This would not matter if there were no satisfactory repercussions. No self-respecting man is likely to stay in a works where the supervision is of that type. Like the man on the plantation, he will make his escape at the earliest opportunity and seek for more congenial conditions. But the question has larger issues. The world's greatest need is production. To achieve this in the greatest volume, the services of the best and quickest workmen are needed. If these are attained by having bosses of the shouting variety, the provision of loudspeakers could be an advantage.

J. E. Powell
Lincoln, England

•

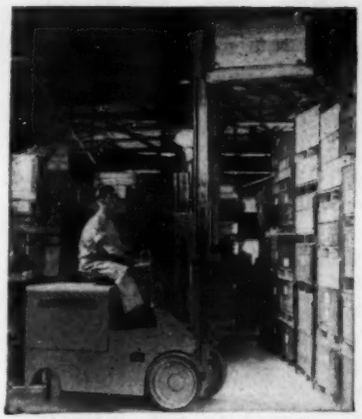
EXCUSES OR EXCELLENCE?

Our sympathy is with Al and his problem of using materials that are not uniform and machines that are about to stop rolling. Yet only the foremen and supervisors can help these conditions.

Poor material should be reported. Maybe nothing can be done at the moment, but if a company is on its toes, the material supplier will hear about the condition and realize that the day of reckoning is fast approaching and will supply at least slightly better quality.

The problem of old machines is a more difficult one. The Government is not at all helpful in its attitude toward depreciation. This means that many companies must operate machines that actually cause them to lose money.

Al must, as all good foremen should do, keep his machines in top condition. He must have the



AUTOMATIC FORK TRUCK

DEPENDABLE POWER

EXIDE-IRONCLAD POWER AND BATTERY ELECTRIC TRUCKS

The efficient, cost-cutting team that speeds materials handling

You gain all along the line when your materials are handled by electric trucks and Exide-Ironclad Battery Power. This modern efficiency team keeps goods moving in greater volume, and saves time and money all day long.

Exide-Ironclad Batteries are preferred for electric truck service because of their great power and dependability . . . a result of special Exide-Ironclad construction, which is unlike that of any other battery.

One important Exide-Ironclad feature is the positive plate which consists of slotted tubes containing the active material. So tiny are these slots that, while permitting easy access of the electrolyte, they prevent the active material from readily washing away. The results are high power ability, longer life, greater economy and safety.

Write us for a FREE copy of Exide-Ironclad Topics which contains "Case Studies" of material handling problems. It tells how to cut handling costs up to 50% . . . covers latest developments in handling materials from receiving to shipping.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

AUTOMATIC TRANSPORTER

WHEN A MAN WITH A PROBLEM...
MEETS A BEATTY ENGINEER...
THERE'S ALWAYS A HAPPY ENDING—
FOR TWO HEADS ARE BETTER THAN ONE —ESPECIALLY IF THE OTHER ONE IS OURS!
THERE'S A BETTER WAY TO DO IT!
HYDRAULIC
SHEET METAL WORKING
EQUIPMENT
BEATTY
MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

BEATTY Horizontal Hydraulic Bullaozer for heavy forming, flanging, bending.

BEATTY Spacing Table handles flange and web punching without roll adjustment.

BEATTY No. 11-B Heavy Duty Punch widely used in railroad industry.

BEATTY Hydraulic Press Brake for V-bending, forming, pressing, flanging.

BEATTY CoPunShear, one unit does coping, punching, shearing.

machine shop or maintenance department set up an inspection schedule on the machines. When they recommend an overhauling, he must not say, "I can't spare the machine." If it isn't spared now the company will have to do without it later when it completely breaks down and needs major repairs. Such repairs always take longer than minor ones.

Your supervisor is worried about the work you produce and how your product fits into the product of other departments to produce a final company product that is a salable piece of merchandise and one that is produced at a cost that can meet competition.

Let's forget the excuses and use our facilities to the very best advantage.

Charles D. Townsend
Centralia, Mo.

•

On this question I have to agree with the big boss, "Al."

I like to think that my company has me on the job because no one else could give them so much for so little.

My men can run the ordinary jobs with regular materials, but I feel that I am there to iron out the tough ones. My men know I feel that way, and never hesitate to call me over.

I get a white shirt dirty once in awhile, but every time I do the operator of that machine gains new respect for me. It gives him an inkling as to why the company put me in charge.

I believe my men regard me as a guide rather than a driver, and the proof is that we all like our work.

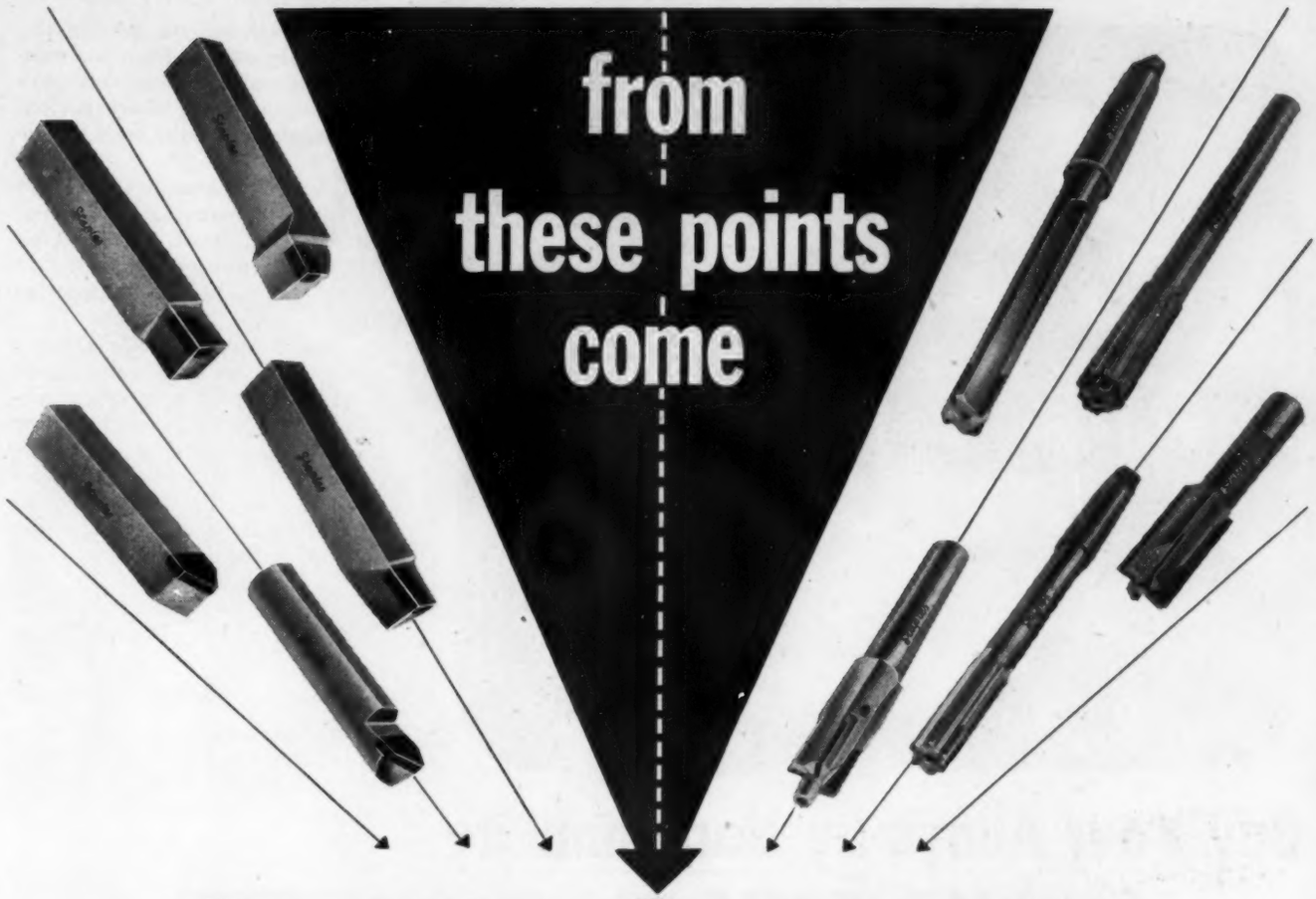
If my job sailed smoothly all the time, I would quit and find a company where I could earn my foreman's wage.

Richard E. Stern
Maywood, Ill.

•

Ed is upset due to the fact that standard of quality is expected of him, plus increased production in spite of the fact that he has inferior material, worn equipment, and employees only interested in the paycheck.

In the case where equipment is not good and repair is needed, and it is not possible to buy it new, it is a good plan to shut down several machines, whether these can be spared or not, get a couple of good maintenance mechanics to put them in good shape, and continue this method until they all have been overhauled. While this is being done



QUANTITY PRODUCTION

STAPLES CARBOLOY-TIPPED TOOLS

CEMENTED CARBIDES

Tool up for higher production with Staples Carboloy-tipped Tools. Now, Staples offers one of the most complete high-quality lines of carbide-tipped tools available today.

Get faster, deeper cuts from Staples single point tools—roller turner, turning, boring, facing tools—milling cutters, form tools.

Get precision hole production from Staples reamers, counterbores, end mills, spotfacers, core drills.

For all *special* tools, submit your requirements to Staples Design and Engineering Service.

To profit in higher production at minimum tool cost, make Staples your Carboloy tool headquarters. Write today for complete information on standard tool designs and prices.

THE STAPLES TOOL COMPANY

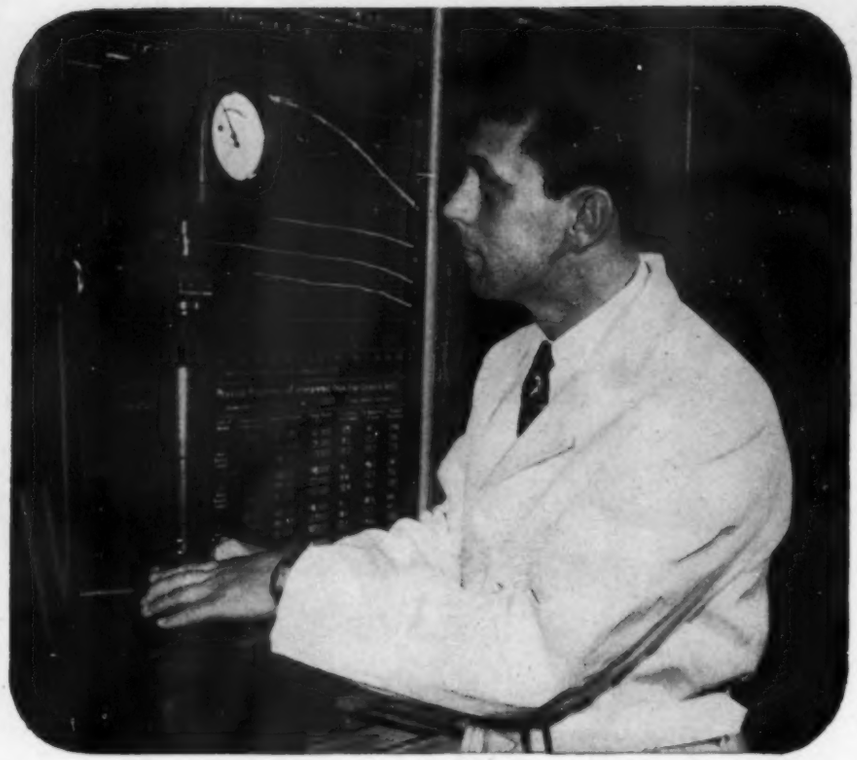
CINCINNATI 25, OHIO

✓ *write for your complete Staples Tool catalog*

Staples CARBOLOY CEMENTED CARBIDE TOOLS

A COMPLETE LINE OF SINGLE AND MULTIPLE POINT CUTTING TOOLS

EXPANSION REAMERS · FORM TOOLS · CENTERS · MASONRY DRILLS · SPECIAL TOOLS



Buy Your Alloys by Hardenability AND SAVE

The Ryerson system of alloy testing enables you to specify alloys on the basis of desired hardenability. That means you're assured of maximum performance in the finished part. It means you avoid the danger of expensive product failure — the possible necessity of replacing unsuitable material.

Ryerson makes possible this method of alloy steel purchasing by carefully testing every heat of as-rolled and annealed alloy steel. The result: positive knowledge of the hardenability of every bar of Ryerson alloy. You can specify on the basis of desired performance, with the assurance that the alloy steel you receive from Ryerson will meet or exceed minimum hardenability requirements.

To ease your task of heat treating, Ryerson includes a complete Alloy Report with every shipment. The report covers: Chemical analysis, result of end-quench hardenability tests, mechanical properties, as interpreted from the test results, and recommended working temperatures for every heat of alloy steel in the shipment.

Hardenability is nothing new with Ryerson. It's been a Ryerson service for ten years now—part of a system designed to assist your buying and assure the correct application of all alloy steels. Take advantage of this *complete* service and contact Ryerson for prompt shipment of all alloy needs.

Joseph T. Ryerson & Son, Inc., Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

Ed can concentrate on getting the best available output from his men by giving each individual his personal attention for a short period. Disinterestedness would soon disappear.

With regard to poor material, Ed is in good company. All concerns are in the same boat. It would be better for Ed to stop producing at all if he can only get an inferior quality of work.

No good foreman makes excuses for his inability to produce good quality, plus a high production volume of work, even if he has poor material, plus indifference of workers and poor equipment. He goes ahead and does the best he knows how with what he has at hand and is satisfied to be judged by the results.

Arthur Silvester
Niantic, Conn.

•

It is an unfortunate position for a conscientious foreman to be in when he has to depend on equipment that is not up to production standard. It is unfair to expect a man to produce in quality or quantity when he has to contend with machines that have gone through the deteriorating storm of war stress.

No one can blame him for complaining of poor material. It is only through the foreman's objections that remedial steps are taken to rectify an error in ordering, or to contribute his share of pressure on the purchasing agent who may possibly be suffering from a serious case of financial myopia.

I do not think a foreman can be classified as progressive if he remains meek and persists in taking it on the chin. Silence may be golden at times, but it does register consent.

Quietly complying with conditions which retard output and mean poor quality means also contributing to industrial delinquency.

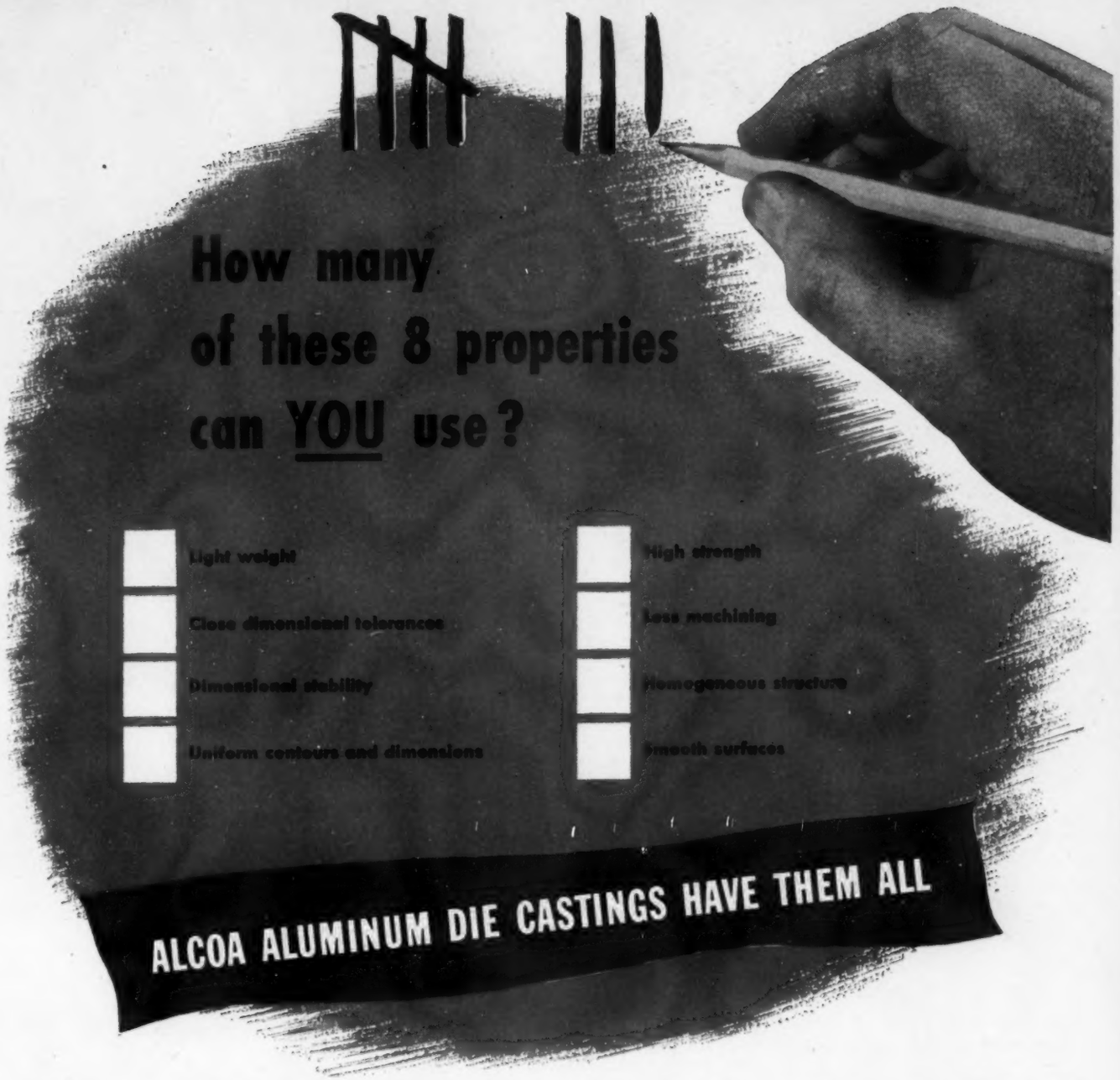
J. Homewood
Ontario, Calif.

•

WHOSE JOB IS METHODS IMPROVEMENT?

In a small plant, where one foreman is responsible for a variety of jobs, he must plan methods, devise tools and setups, order patterns as needed, decide upon repairs or renewals to damaged parts, and handle many other details.

In the large shop, where many foremen are employed, a methods



Perhaps you're building machines to be used at elevated temperatures. Then you'll take advantage of the dimensional stability of aluminum die castings. And naturally, you'll be interested in their light weight and close tolerances.

Or you may be needing parts for machines that operate at sub-zero temperatures. Alcoa Aluminum Die Castings are your choice. They do not get brittle and weak at low temperatures. They hold their high tensile properties.

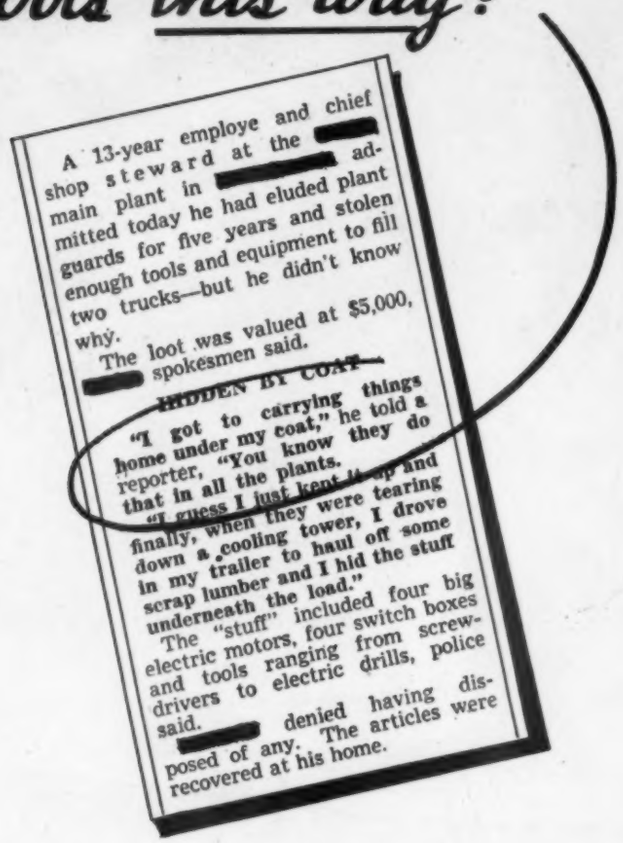
You'll get all these advantages of aluminum die castings if you'll call in Alcoa while your ideas are still ideas, before designs are too far along to change. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in 54 leading cities.

MORE PEOPLE WANT MORE ALUMINUM FOR MORE USES THAN EVER

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM

Are You 'too' losing tools this way?


A 13-year employe and chief shop steward at the [redacted] main plant in [redacted] admitted today he had eluded plant guards for five years and stolen enough tools and equipment to fill two trucks—but he didn't know why.
The loot was valued at $5,000, [redacted] spokesmen said.
HIDDEN BY COAT
"I got to carrying things home under my coat," he told a reporter, "You know they do that in all the plants.
"I guess I just kept it up and finally, when they were tearing down a cooling tower, I drove in my trailer to haul off some scrap lumber and I hid the stuff underneath the load."
The "stuff" included four big electric motors, four switch boxes and tools ranging from screw-drivers to electric drills, police said.
[redacted] denied having disposed of any. The articles were recovered at his home.

Every one recognizes the fact that tools disappear this way, when antiquated checking systems are used. Do you realize how much these losses amount to every year *in your own plant*?

Unless you have complete control of the tools in your cribs you can not know. You can be sure though that such hidden losses are adding many dollars to your costs.

McCaskey Tool Control will stop them by making each employee 100% responsible for every tool loaned to him—by accounting for all of your tools all the time whether in or out of the crib—by reducing tool inventories—by cutting breakage—by locating and preventing numerous "hidden losses."

Why not make it impossible for an employee in your plant to say, "You know they do that in all the plants"? Investigate and adopt McCaskey Tool Control now!

Whether you have one or several cribs for production or maintenance work, McCaskey Control will cut your tool costs and prevent production delays. Write for reports of cost-reduction and improved operations in several well-known plants, both large and small.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

improvement supervisor is necessary. Generally engineers are better qualified to develop new methods than are men who have only shop training. Not all foremen have the time or the training to do the work.

In many shops there exists an unwritten law that new ideas be submitted to the foreman for his approval. If a foreman has a petty or jealous nature (and all foreman are human), the new idea may come to an untimely end, the employer being the loser.

It is better that there be a central headquarters where all planning ideas can be cleared; also a place to watch that a method or shortcut in department A does not work a hardship in B, C, or D.

While it is often practiced, it is not fair to expect a foreman to spend his time off duty in the study of methods improvement. One man on duty all the time can do more than many foremen with little time to spare.

F. M. A'Hearn
Greenville, Pa.

•

Foremen are in a favorable position to see the need of methods improvement, and do in many instances suggest the need, as well as the outline of the changes. But they are not in a position, neither do they have the time, to work out in detail the procedure that will best fit in the organization as a whole.

The engineer can take the time and can concentrate on the improvements needed to an extent that the foreman could not find time to do. Neither could the foreman do the engineering part of a plan as efficiently.

The foreman's special and most important field is dealing with men; the engineer's special and most important field is dealing with materials.

Separately neither can work out the best plan. It requires the knowledge of both for the best results. Cooperation is essential, and its value cannot be overestimated.

John Mark May
Watervliet, N. Y.

•

The responsibility for methods improvement is accepted as a matter of course by the foreman in a small shop, with the assistance of old-timers in the organization. Many worthwhile suggestions originate from the men at bench or lathe, and the wise foreman is one who encourages the men to offer them.

When we come to the larger or-

All Lovejoy Blades for Type "A" Milling Cutters are interchangeable from 4½" to 24" in diameter

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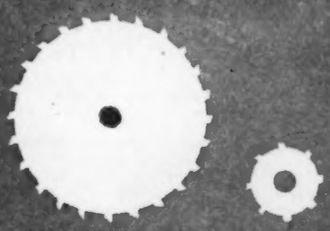
A complete engineering service, backed by an experienced staff, is at your service to make recommendations and design special cutters.



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Hundreds of sizes, dozens of models to meet every requirement, regardless of machines used or materials to be cut.

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Even special tools use standard parts which are stocked by us. There are 20 Lovejoy service centers throughout the U.S.A. — there is one near you.

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Nearly 30 years' continuous experience making milling cutters and other "Positive-Locking" tools. Our first customers are still buying our tools.

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The Type "A" blades are held in the housing with the famous Lovejoy "positive-locking" device. This means that a minimum of stock must be removed when sharpening. It allows utilization of a large per cent of each blade. It holds the blades immovably, even during heavy, intermittent cuts.

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ganizations, where a foreman is responsible for the supervision of a department employing 80 to 100 men, it becomes apparent that he cannot reasonably be expected to devote the time necessary to visit each machine or man. Thus he loses contact with the source of many fruitful ideas in methods improvement.

Therefore, the department foreman in the larger setup should assist and cooperate with the methods personnel selected for his department.

The ideal setup for methods improvement in the larger plant would be to have a methods man in each department, supplemented by the suggestion-box plan. The methods man selected need not be a graduate engineer, but should possess sufficient technical knowledge to break down each operation so elimination of waste motion is assured to improve quality and increase production.

Robert S. Alexander
Greenville, R. I.

•

Methods improvement is not only a foreman's job, it is the job of everyone within an organization from laborer up to president. But no one can devote enough time and energy to this task and at the same time perform regular duties effectively.

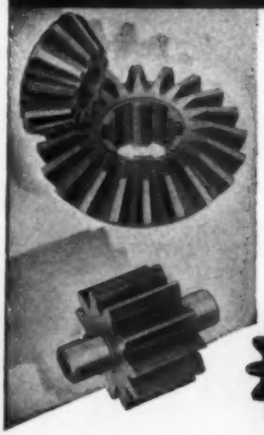
In view of this, and because costs are important in competitive industries, a well-organized and capably staffed methods department has a vital place in modern manufacturing organizations today. It does, however, require an alert top management to determine whether such a department is properly set up and justifying itself in the organization.

There are differences of opinion regarding the establishemnt of a methods department, due to conflicts and friction which sometimes develop between methods men and shop supervision.

In my opinion, if the methods department is so placed on an organization chart that the head of this department reports to the manufacturing superintendent, as do the foremen, more effective coordination will be achieved between methods men and shop personnel.

With both the foremen and methods men reporting to the same boss, foremen will gain more confidence and give more freely of their help and advice. Along with this they will not fear that the methods department will be given the full credit for all the methods improvement.

Peter L. Budwitz
New Britain, Conn.



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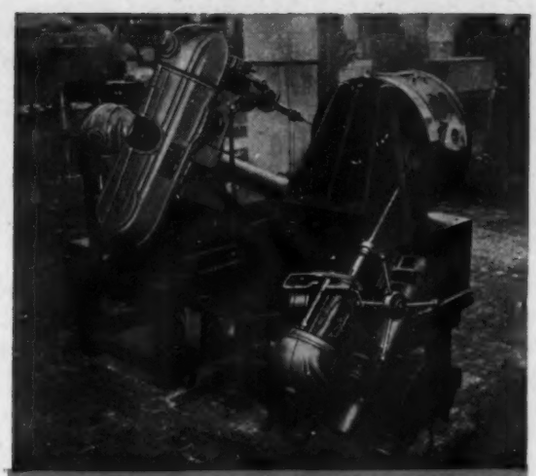
"To eliminate costly setup time, a number of small individual jig-drill combinations employing Walker-Turner standard drill units costing $100 to $400 have been installed.

"Housing sections of the Wright Cyclone engine require hundreds of holes of various depths, diameters and angles. With this installation the changing of jigs and fixtures becomes unnecessary.

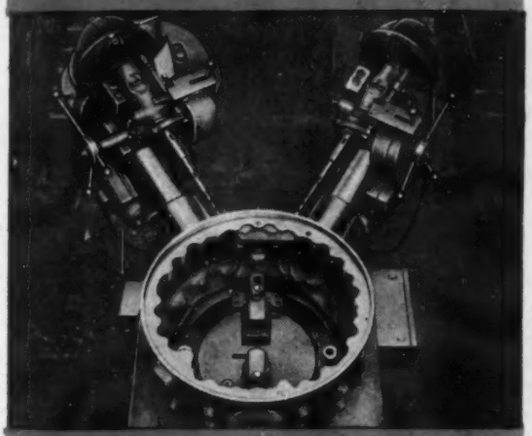
"PRODUCTION SCHEDULES ALLOWED AS MUCH AS 30% OF TOTAL OPERATION TIME FOR THIS SETUP PROCEDURE. This new method eliminates setup and the possibility of error is reduced.

"We now have more than 30 special jig-drill setups employing Walker-Turner Drill Heads in this plant all working to our complete satisfaction."

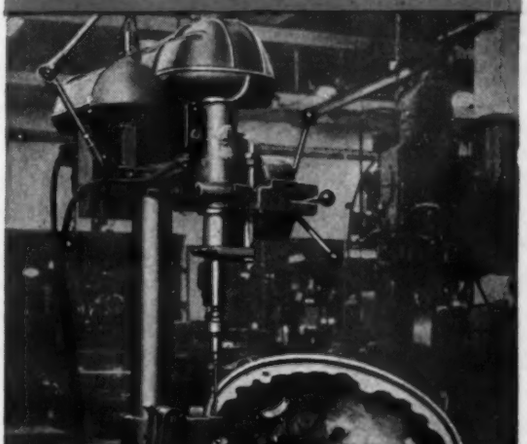
E. PRANGE, *Supervisor*
Process Engineering
Wright Aeronautical Corp.



Operating on the bottom of the workpiece, two Walker-Turner 20" Power Feed Drill Presses are used in this installation.



By placing two Walker-Turner 20" Power Feed Drill Heads in a horizontal position, loading of the cumbersome workpiece is greatly facilitated.



Two angular oil passages drilled into distributor pads with Walker-Turner 20" Power Feed Drill heads.

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NEW BOOKS

CONFERENCE GUIDE TO BASIC MANAGEMENT TRAINING—*By Arthur S. Hotchkiss. Published by The National Foremen's Institute, Inc., Deep River, Conn. 196 pages, 8x10 in. Price $5.50.*

Objective of this book is to serve as a guide manual for presentation of directed conference subjects and development of improved industrial supervisory practices. Adaption of this manual as a suggestive outline to a supervisory training program should result in fast-moving, effective conferences stimulated by group discussions.

The manual is divided into outlines for ten consecutive sessions of approximately 2 hr. each. It details points to be discussed with time allowances for each point. It can be followed closely as its details include directions to the conference leader on exactly what to say and even when to use a blackboard, or it can be followed broadly with due regard to company policies.

The ten-session material covers: program introduction, development of responsibility, relationship of responsibility and authority, basic relationships of supervisor and union, company policy on union recognition, labor agreement, grievances, job relations and training, interviews and discipline. Also included as a separate booklet is a supervisor's guide to the Labor-Management Relations Act of 1947, better known as the Taft-Hartley Act.

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MARKETING SERIES BULLETINS—*Published by the American Management Association, 330 West 42nd St., New York 18, N. Y., from papers presented at the 1946 marketing conference.*

Bulletin No. 65 (40 pages—$0.75)—Where Do We Stand in Salesman Selection by John P. Foley, Jr., Visual Aids in Sales Training by Floyd E. Brooker, What Does Youth Think of Selling as a Career by Robert M. St. Clair and Sydney Lichtman and How to Run a Sales Conference—panel discussion.

Bulletin No. 66 (27 pages—$0.50)—Basic Concepts in Compensation of Salesmen and Field Executives by Harrison A. Roddick, The Compensation Plans as a Means of Increasing Sales Coverage by Don G. Mitchell and A Case Story in Compensation by William E. Jones.

•

PRACTICAL DESCRIPTIVE GEOMETRY. *By S. E. Rusinoff, M.E., Associate Professor of Mechanical Engineering, Illinois Institute of Technology. Published by American Technical Society, Drexel Ave. & 58th St., Chicago 37, Ill. 259 pages.*

This book is intended as a link between the prerequisite of standard mechanical drafting and plane geometry, and the understanding and delineation of complicated compound surfaces like airfoils, turbines, and complex piping. Descriptive geometry deals with space problems by representing them graphically on one or more flat surfaces. Simple curved surfaces, and the intersection of any two simple curved surfaces can be represented accurately by development. Double or compound curved surface can only be approximated but the methods of approximation are important.

Other important practical problems arise when several lines or planes are distributed at various angles to each other and the dimensions of the resulting configuration are required.

Practical problems and examples are used wherever possible throughout the book.

•

ELECTRIC MOTOR MAINTENANCE—*By W. W. McCullough. Published by John Wiley & Sons, Inc., New York, N. Y. 126 pages. Price $2.00.*

Maintenance is the practical, day-today, anticipation and prevention of trouble. Of prime importance is the keeping of records, continuing the unbroken operational history of equipment so its condition at any time can be predicted with considerable certainty.

Electric motors convert electrical energy into mechanical energy, and the mechanical maintenance occupies most of the serviceman's time. Foundations, couplings, transmissions, bearings and lubrication require close and frequent inspection. Electrical maintenance—commutator, collector and brush cleaning, armature bands, and wedges, and condition of insulation—are vital, although inspections can be less frequent.

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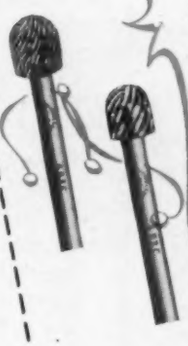

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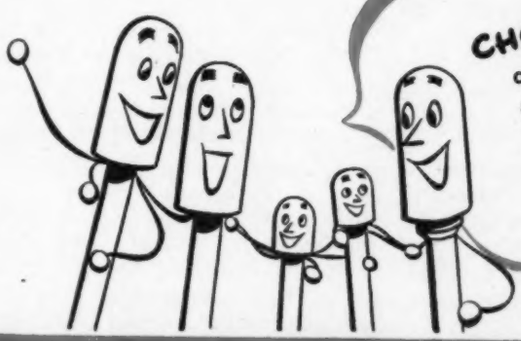

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which clearly explains the principles as well as the details of motor maintenance and gives basic operational characteristics and applications of all kinds of rotating electrical machinery.

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INDUSTRIAL MANAGEMENT — *Fourth Edition. By Prof. Richard H. Lansburgh, and W. B. Spriegel, head of dept. of Industrial Management, Northwestern University. Revised by Spriegel. Published by John Wiley & Sons, Inc., New York, N. Y. 656 pages—6x9 in. Price $5.00.*

Maintaining a well-appreciated balance between theory and practice, the author's current revision encompasses both the viewpoint of college student and executive. Thorough coverage of the field is broken down into nine main parts covering such salient topics as organization structure, plant and equipment, motion and time study, wage payment, material and product control and industrial relations.

Developed from the point of view of the mid-sized plant, material and illustrations are basically applicable to both small and large enterprises. Interdependence and relations between various departments are stressed throughout.

The fourth edition, enhanced by over 125 new illustrations, offers recent technical information and adds a chapter on maintenance.

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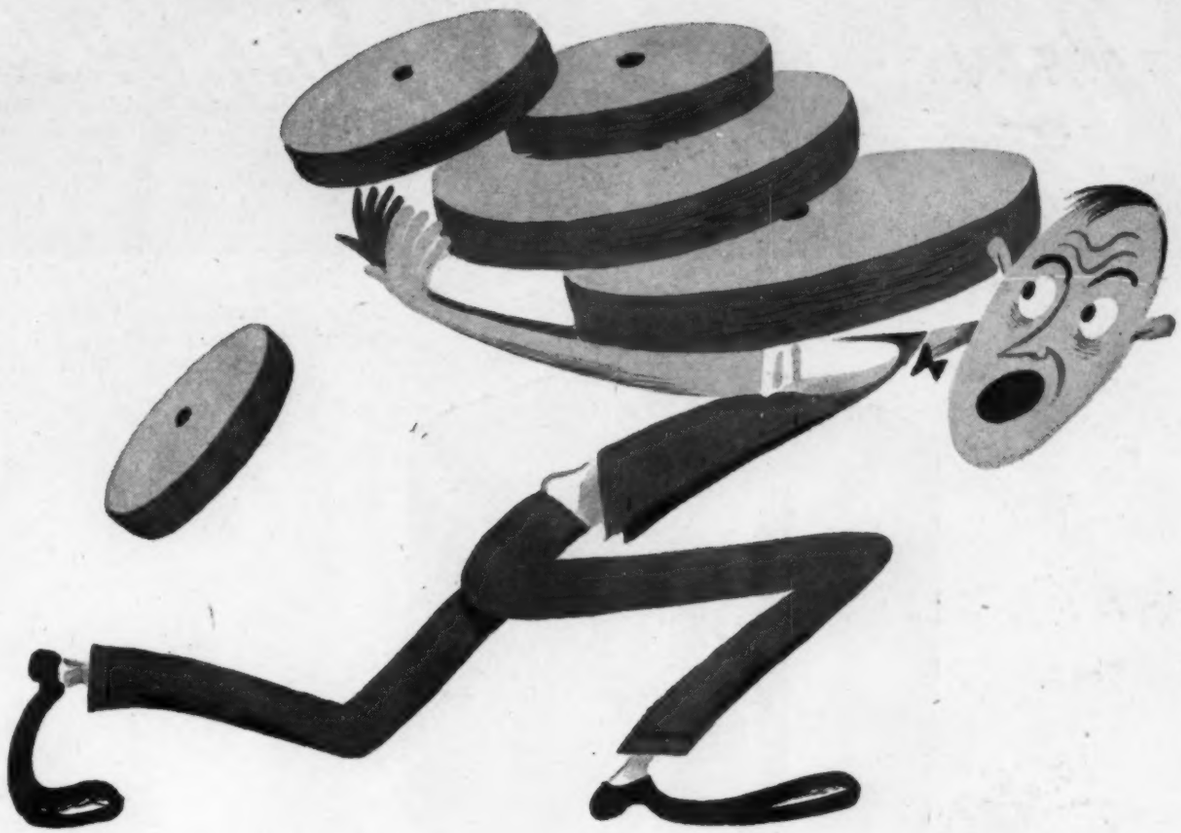
WHATEVER BECAME OF SLOW JOE BLOW?—*By Charles K. Ellsworth and J. R. MacAllister. 16-page booklet. Free copy available on request to MacAllister Publications, 420 Lexington Ave., New York 17, N. Y.*

Cartoons and text are used in this industrial-relations booklet to explain the importance of shop rules to the worker. "Slow Joe," in a woeful tale, breaks almost every rule in his establishment, does all sorts of damage, is finally fired. He serves as a good example of how NOT to behave. The rules, suitable for any plant, are given below the cartoons.

Burdened down with "loaded" wheels?



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- *Drill Breakage*
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Replace your old chucks now — to prevent wasted man hours and material. Your Industrial Supply Distributor has new Jacobs Chucks in stock.

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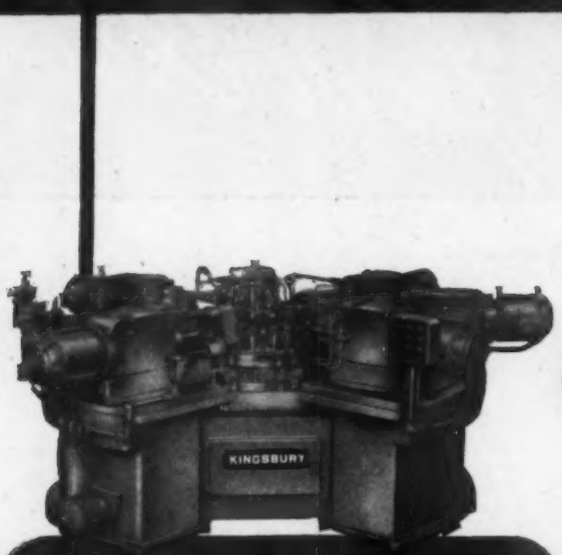

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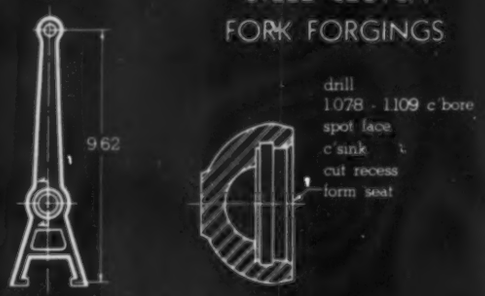
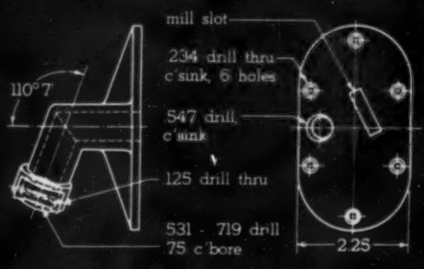


PROBLEM Drill, counterbore, countersink, spotface, form and recess the ball socket with one operator. Operations must be concentric.

METHOD A 20-inch indexing machine provides an easy solution. Eight identical fixtures on the index table hold the parts and present each one in turn to seven drilling units. Operations are concentric because 1) spindles are located to exact indicator readings, 2) plates for tool guide bushings pilot to the fixtures and 3) no part is disturbed in its fixture until finished.

Production rate 200 pieces per hour.

CAST IRON OIL PUMP COVER



PROBLEM Drill, counterbore, countersink and mill from 4 directions with one operator. One direction is 90°-110° away from the others.

METHOD The indexing machine for this job is the central column type that can support several vertical units even at compound angles without interference. All tools are in easy reach as the rear view shows. There are five units on the inside column, one on an outside column and four on a special low base. The 40-inch index table has ample area for the fixtures.

Production rate 246 pieces per hour.

Kingsbury machines feature:

Automatic units Up to 5 hp. Individual speed and cam feed control for efficient operation. Operate at angles. Use multi-spindle auxiliary heads for operations of about equal size and depth.

Accurate location Spindles located to exact indicator readings. Plates for tool guide bushings pilot onto fixtures.

Reduce costs Increase output per man-hour. Reduce handling. Save space.

Uniform product Unvarying work cycle. All fixtures on index tables exactly identical and located to ±.0002.

Operations in exact relation No part disturbed in its fixture until completed.

Synchronizing Prevents the index table from moving until every tool is retracted.

Completely tooled Ready for use.

Electrical installation Complies with Machine Tool Electrical Standards.

Rugged construction Will do accurate work for years at intense production. Wear parts of heat-treated alloy steel. Preloaded precision spindle bearings. Gears induction-heated and shaved. All castings normalized before machining.

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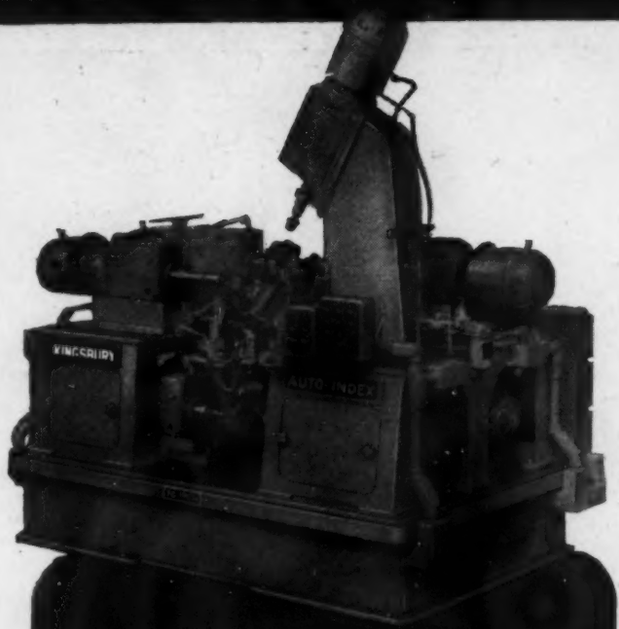
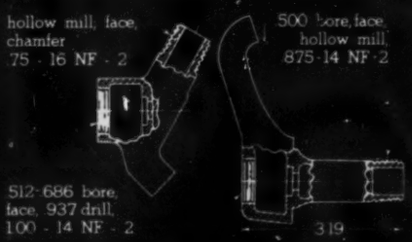


BRASS FAUCET CASTINGS

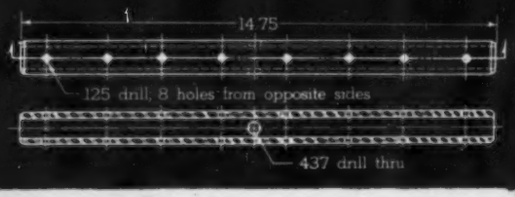


PROBLEM Rough and finish bore, face, hollow mill, drill and tap 120° apart on one faucet and 180° apart on another with the same machine.

METHOD Here indexing is vertical so that the drilling and tapping units can operate from opposite directions. Four units on the left side perform the operations common to both parts. Three units on the right work on the opposite end of the faucet shown on the right. Two units, one on an angular column and one on a rear knee (hidden), complete the 120° faucet.

Production rate 505 pieces per hour.

STEEL SHAFT FOR TRACTOR ENGINE



PROBLEM Drill eight holes in line from opposite directions and another hole 90° away with one operator. Locations must be accurate.

METHOD Each hole has only one operation, so all tools operate together on the same part. There is no indexing. Two opposed units with 8-spindle auxiliary heads drill the .125 holes. The fixture contains their drill guide bushings. A vertical unit drills the .437 hole. Its bushing plate pilots to the fixture and then pulls up to make room for unloading and loading.

Production rate 160 pieces per hour.

Many types of basic machines in our line enable us to solve many kinds of problems, large or small, in combined operations for high production.

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KINGSBURY

International Harvester Co.

200-ton "C" Frame Lake Erie Hydraulic Press in operation in the McCormick Works of the International Harvester Company. Press has 35-ton cushion in bed. Lake Erie manufactures hydraulic presses in a wide range of standard sizes and types to meet almost every need. Special presses are quickly engineered to order when required. Bulletin illustrating and describing the various models now available may be had on request.

gets better production with LAKE ERIE Hydraulic Press

Forming frame member for International Harvester Binder in Lake Erie Hydraulic Press. The wide opening in this press is a well-liked feature as it permits ease of handling of the work and makes possible the fabrication of a wide range of sizes. This press has increased production and product quality for International Harvester.

The International Harvester Company—whose slogan is "Better Production for a Better Future"—is always alert for new and improved ways of doing things. The Lake Erie Hydraulic Press recently installed in the McCormick Works of the company provides a good example of the way in which International Harvester and its customers benefit from this policy.

In the production of frame members for binders, the Lake Erie Hydraulic Press is turning out about 200 parts per hour as compared with 100 to 125 parts per hour by the old method. In addition to greater production, the part itself is now of better quality as the metal is "set" by the squeezing action of the hydraulic press and dimensions and straightness are held to closer limits. In the manufacture of a transmission gear for a mower, the hydraulic press works to a tolerance of .004″ of final machined size as against about 1/16″ by the old method. To the saving in metal and machining is added a rate of production almost double that obtained heretofore. And there are numerous other jobs on which the new press is proving equally proficient.

Lake Erie Hydraulic Presses available today are introducing new economies in production in a wide range of industries. It will be worth your while to check up on the applications and advantages of these new, faster hydraulic presses for various phases of your production. An experienced Lake Erie Engineer will assist you, without obligation, if you desire.

● Leading manufacturer of hydraulic presses—all sizes and types—metal working...forging... metal extrusion... plastic molding... processing...rubber vulcanizing...stereotyping...special purpose.

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.
MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY
General Offices and Plant:
507 Woodward Avenue, Buffalo 17, New York

★

FELLER ENGINEERING DIVISION
SPECIALISTS—EXTRUSION AND
FORGING PRESSES
1100 Empire Building, Pittsburgh 22, Pennsylvania

OFFICES IN PRINCIPAL CITIES AND FOREIGN COUNTRIES

Find THE RIGHT SPEED AND FEED . . . *Quick!*

WITH THIS NEW SPEED AND FEED SELECTOR FOR *Enduro* STAINLESS STEEL BARS

SEND FOR YOUR SPEED AND FEED SELECTOR—TODAY. You'll find it one of your most valuable aids in machining ENDURO Stainless Steel Bars. *AND IT'S FREE!*

On one side it shows QUICKLY the recommended speeds and feeds for all automatic screw machine operations on the popular stainless steel analyses.

On the other side it gives spindle speeds in surface feet or revolutions per minute—together with the main chemical components of the machining stainless steels.

And for those who wish to hang it at their machines or drawing boards, it's punched and reinforced with a metal eyelet.

Get your Selector NOW—by writing to:

REPUBLIC STEEL CORPORATION
ADVERTISING DIVISION, DEPT. AM
3100 E. 45th Street • Cleveland 4, Ohio

NOW AVAILABLE FOR QUICK DELIVERY
Republic ENDURO Stainless Steel Bars, hot rolled or cold finished—also Wire—in a complete range of sizes and types.

Republic REPUBLIC STEEL
ENDURO STAINLESS STEEL

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Professional Worriers!

Every business, time and again, runs into production snags. When the problem is *lubrication*, we're often called in to do the worrying. And eight times out of ten we come up with the right answer—*fast*. Because that's our job day in, day out, year after year—putting petroleum to work *efficiently*. This backlog of experience, coupled with the world's finest lubricants and fuels, is your best reason for calling Cities Service next time trouble calls on you.

CITIES SERVICE STOPPED TROUBLE HERE!

A screw products company in Cuyahoga Falls, Ohio, called on Cities Service for advice on machining a part of an intricate mechanism made of aluminum that required extreme accuracy and finish. Chillo Oil No. 22 was recommended. Thereafter, the manufacturer reported the machined work was not only well within the required tolerances, but the work had a mirror-like finish. Tool life was also phenomenally good.

A brick and tile company in Iowa suffered numerous failures of the main drive-shaft bearings in their Hammer Mill Crushers. Cities Service engineers recommended Pacemaker Oil No. 2. The last report from the company said that since they standardized on this lubricant, no bearing failures have occurred.

"We use Solvent No. 26 for cleaning surplus oil and grease out of electric clock movements and we find it unexcelled for this purpose" ...so writes the president of an Illinois watch repairing and rebuilding concern after continued use of this remarkable new Cities Service metal cleaning fluid.

A bus company executive in Cleveland, Ohio, recently said, "During the past four years, we used Cities Service Heavy Duty type oil with outstanding results—minimum wear, freedom from sludge and no engine failures—which has enabled us to give uninterrupted service to our customers."

CITIES SERVICE OIL CO.
New York—Chicago

CITIES SERVICE

ARKANSAS FUEL OIL CO.
Shreveport, La.

Cities Service Oil Company
Room 276, Sixty Wall Tower
New York 5, N. Y.

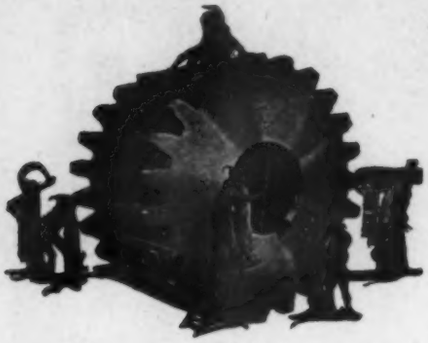
Gentlemen: I have a production problem that involves lubrication. I would like to discuss it with one of your lubrication engineers, without obligation, of course.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____



GANSCHOW

CUT ALL GEARS TYPES

Better Gear Products

GANSCHOW GEAR CO., 14 N. Morgan Street, CHICAGO 7.

GEARS TO ORDER

Spiral and helical gears; special couplings, bushings and collars; pins, pulleys and rollers. Made to your specifications—*promptly*.

KELLEY GEAR & TOOL CO.
Bristol, Tennessee

ELLIPTICAL GEARS

Also Other Non-Circular Gears

ALL TYPES OF GEARS

BILGRAM GEAR & MACHINE WORKS
1217-23 Spring Garden, Philadelphia, Pa.

Why

PITTSBURGH GEARS

Last Longer

"Customer's specifications" and metal alone won't produce gears that can "take it" in actual use. PITTSBURGH GEARS are a combination of these PLUS 30 years gear making "know-how" and scientific heat treating that impart working hardness, free from internal stresses. Result: Longer, economical gear life. Quotation requests invited.

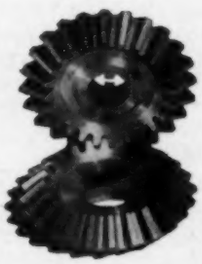
PITTSBURGH GEAR
AND MACHINE COMPANY | 27th & Smallman Streets PITTSBURGH 22, PA.

PIONEER PRODUCER OF QUALITY GEARS

D.O.James

GEARS For INDUSTRY

SINCE 1888 . . . We have been making many types and sizes of gears for industry. Vast plant facilities of the most modern gear cutting equipment assure capable handling of your *production* or *special* gear requirements.



HELICAL and BEVEL GEARS—From 1" to 60" in diameter and from 24 DP to 1½ DP.
SPUR GEARS—Size range from ¾" to 150" in diameter. 32 DP to ¾ DP.
HERRINGBONE GEARS—Made from 1" to 60" in diameter and from 10 DP to 1½ DP.
SPIRAL BEVEL GEARS—Made from 1" to 30" in diam. and 24 DP to 1½ DP.
WORM GEARS—Made from 1" to 100" in diam. and from 24 DP to 1 DP.

YOUR GEAR INQUIRIES WILL RECEIVE IMMEDIATE ATTENTION

D. O. JAMES GEAR MANUFACTURING COMPANY
1140 W. MONROE ST. • CHICAGO 7, ILL.

Almond Drill Chuck

The Original Manufacturers of Drill Chucks

. . . for over 70 years

ALMOND THREE-JAW DRILL CHUCKS—the first to be placed on the market more than seventy years ago—pioneered the field of drill chucks. During all these many years, ALMOND CHUCKS have continued to be a necessary part in the logical procedure of machine developments. Made in types and sizes to fit all machine tools and portable drills.

Write for further information.

T. R. ALMOND MFG. CO.

Ashburnham, Mass., U.S.A.

GEARS

SPURS, SPROCKETS SPIRALS, BEVELS

Short or production runs guaranteed workmanship reasonable prices

THE PRECISION GEAR CO.

743 Main Street, Walpole, Massachusetts

ATLANTIC FOR GEARS

Our service on small gears, due to new equipment recently installed, will interest you.

Send samples or blueprints for quotation

ATLANTIC GEAR WORKS, INC.

200-D Lafayette St., New York 12, N. Y. Phone CAnal 6-1441

GEAR CUTTING MACHINES

Well Designed
Good Features
Create Production Advantages

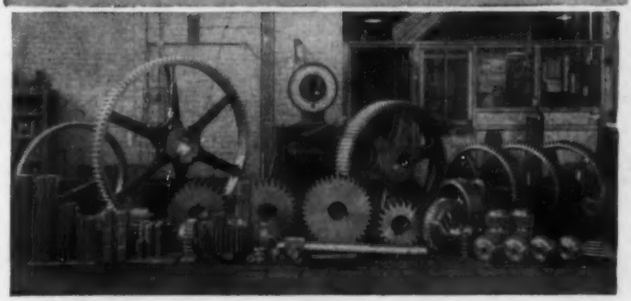
43 Years' Experience

NEWARK GEAR CUTTING MACHINE CO.

69 Prospect Street, NEWARK 5, NEW JERSEY

FRANK E. EBERHARDT, *President*

GEAR ECONOMY
begins with BRAUN
The Braun Gear Company has been shaping the wheels of industry for more than 38 years, producing gears of quality at economical prices. The large, thoroughly modern Braun plant is now more than ever equipped to supply the things that count in gears—precision workmanship, fine materials, good design, and prompt service.
Send samples or prints and specifications for immediate quotations. Whether your requirements are for one gear or thousands, you will find that economy begins with Braun!
MORE BRAIN GEAR BRAUN
BRAUN GEAR COMPANY
1592-96 Atlantic Avenue, Brooklyn 13, N. Y.



Six-footers and tiny pinions . . . spurs, worms, bevels, racks and spirals . . . they're all Stahl-cut, ready and waiting for delivery.

This is a typical example of the output of our modern gear cutting plant. We are equipped to handle gears as large as six-foot spurs, and other sizes in proportion for bevels, spirals, worms, racks and pinions. For every type of gear . . . for every heavy duty requirement . . . *get a Stahl estimate first!*

STAHL GEAR & MACHINE CO.

3901 Hamilton Ave. CLEVELAND 14, OHIO

Earle believes it's good business to "give you the kind of work you want"—good business for you, and good business for us.

For over 40 years, we have been meeting the needs of hundreds of concerns for gears of all types to exact specifications. They can be cut from any practical material and in diameters from inches up to 30 feet. Expertly made to meet your most exacting requirements, Earle also makes racks with medium to heavy pitches, gear reducing units, and operating units for bridges, gates, locks, heavy industry, etc.

It's good business for you, too, to get exactly the kind of work you want. It's equally good business for us—we believe our guarantee to you has been the reason we have enjoyed continuing success.

So it's just good business when we ask you to send us your drawings or specifications for quotation. THE EARLE GEAR & MACHINE CO., 4723 Stenton Ave., Philadelphia 44, Pa. Sales Offices: 149 Broadway, New York 6; 901 Davis Ave., Pittsburgh 12, Pa.

EARLE GEARS

SPUR, BEVEL, WORM, SPIRAL, HERRINGBONE AND RACKS, ETC.

CINCINNATI . . .
Spiral Bevel Gears
HAVE MUCH TO OFFER

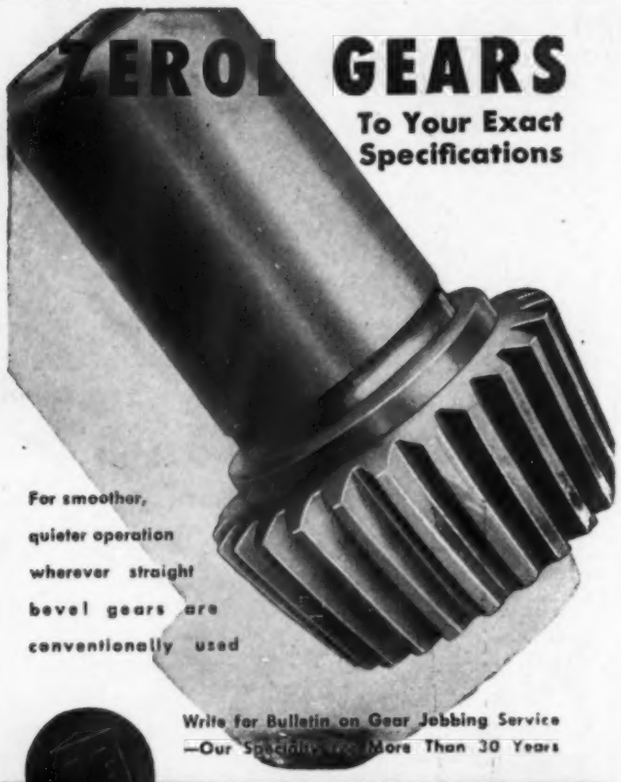
Maximum performance and dependability are two qualities that are absolutely essential in gears for any industrial purpose.

All Cincinnati Spiral Bevel Gears are cut, tested, matched, lapped and marked in individual sets . . . to insure correct bearing location on teeth.

For smooth, efficient operation at high speeds . . . specify Cincinnati Gears, *Good Gears Only!*

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

ZEROL GEARS
To Your Exact Specifications

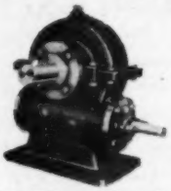


For smoother, quieter operation wherever straight bevel gears are conventionally used

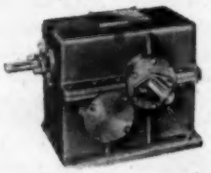
Write for Bulletin on Gear Jobbing Service
—Our Specialty for More Than 30 Years

DETROIT BEVEL GEAR CO.
8130 JOS. CAMPAU • DETROIT 11, MICH.

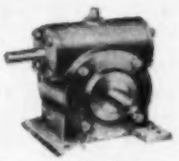
Grant
SPEED REDUCERS



Style WB . . . Worm at Bottom



Style WS . . . Compound Worm and Spur



Style WT . . . Worm at Top

Style V . . . Vertical Work Gear Shaft

Engineered for Performance

Available in many types and ratios to meet the various needs of designers for units providing the required links between high speed motors and slower operating driven equipment. They are the result of seventy years engineering "know-how" and can be depended on for accuracy, durability and dependability. Ask for illustrated literature giving detailed specifications.

GRANT GEAR WORKS
SOUTH BOSTON 27, MASS.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your business.*

What happens when the "push-overs" start pushing back?

ASK ANY GOOD SALESMAN, and he'll tell you that the lush days are just about gone—along with shortages, slow production and the sellers' market.

Today, customers are playing hard to get. The "push-overs" are beginning to push back. Production isn't lagging any more—it's already nearly double the pre-war level, and fast catching up with demand. There's plenty of healthy competition in sight. And you can be glad there is.

American business has always thrived on competition. It still can. But the machinery of selling and distribution will have to work at peak efficiency.

And that means — *more mechanization!*

Mechanization is simply the application of assembly-line methods to the *manufacture of a sale.* It's the only way to balance mass production.

With mechanized selling, you won't turn prospects into "push-overs," but you'll certainly get them leaning your way. By exploring the field, arousing interest, creating a preference for the things your company makes, mechanized selling multiplies the productive capacity of your sales force by the hundreds, or thousands, or by any number your market requires.

But this machine is no stranger to *you.* You know it by its first name—ADVERTISING.

We'd just like to point out that now is the time to put the machine to work, more consistently, more aggressively than ever. And remember that when your advertising goes to work in the right business papers, with their tremendous concentration of hand-picked readers, it becomes *the most efficient machine* you can use for manufacturing sales at a profit.

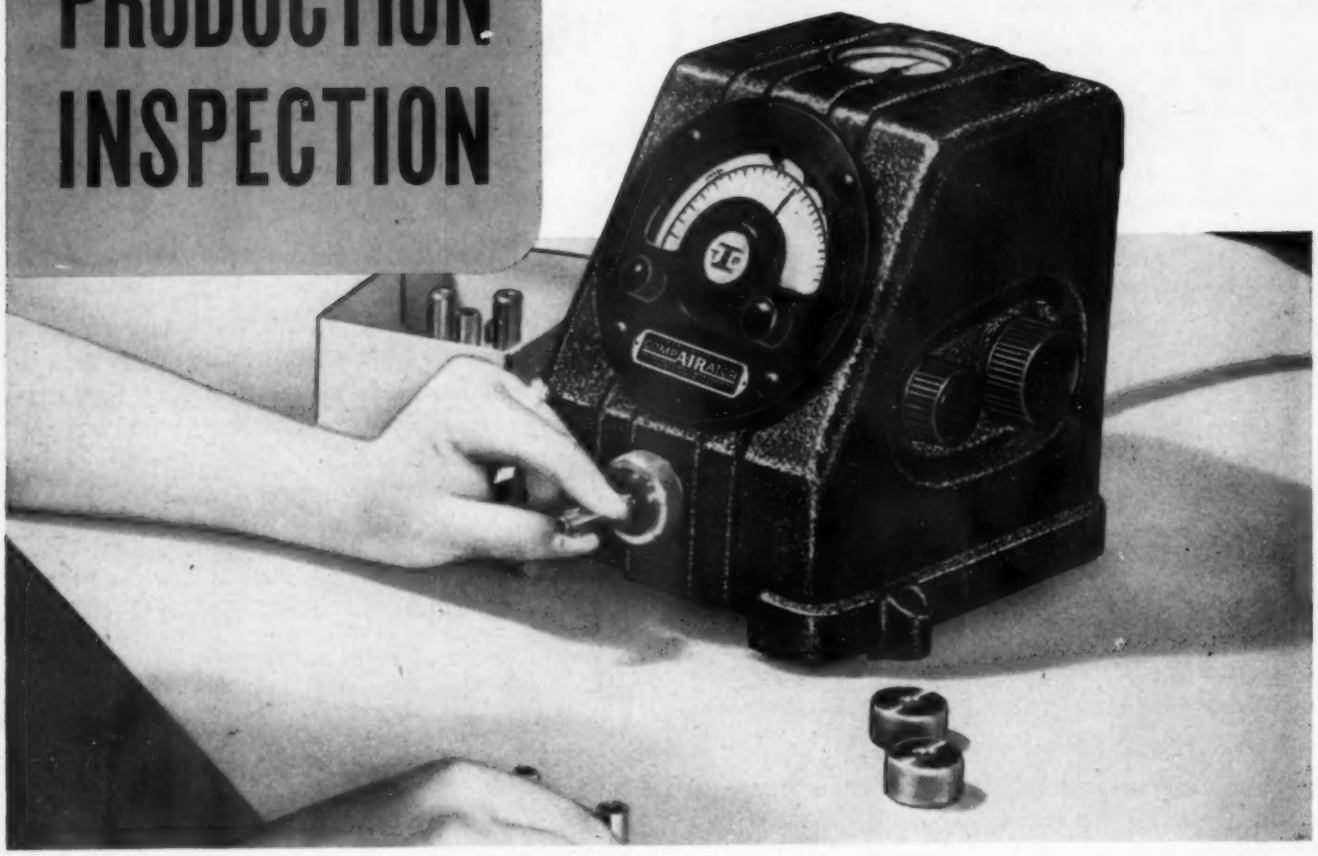
Just how efficiently does business paper advertising work? If you'd like to see some examples, we'll be glad to send you a recent ABP folder on actual results. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, you may have them for the asking.

American Machinist

is one of the 129 members of The Associated Business Papers, whose chief purpose is to maintain the highest standards of editorial helpfulness—for the benefit of reader and advertiser alike.

Speed up and Save on PRODUCTION INSPECTION

...with the New TAFT-PEIRCE COMPAIRATOR AIR GAGE



Complete and self-contained to include regulator and filter, this modern air gage is 7" wide, 8½" deep, 8" high and weighs only 12 pounds.

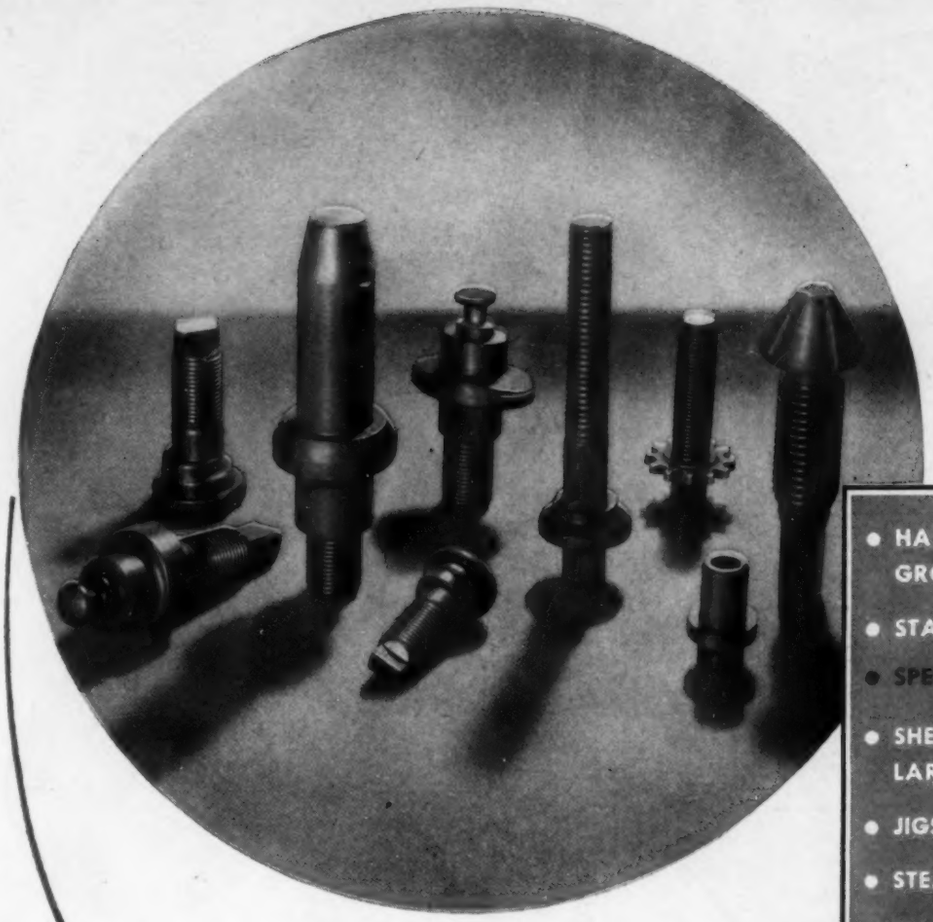
All the operator has to do is to attach the hose to the air line. He needs no special skill to operate the gage, *which measures without mechanical contact.* He easily can check all variations such as taper, out-of-roundness, bell-mouth, and barrel-shaped conditions.

The T-P CompAIRator combines high sensitivity with easy readability. The dial indicator provides accurate readings, *free from pointer-flutter.*

Take the "air-way" to faster and more economical inspection at the machine, at the bench, or in the inspection room. Write for illustrated bulletin on the new CompAIRator to The Taft-Peirce Manufacturing Co., Woonsocket, Rhode Island.

T-P means TOP PRECISION

Use TAFT-PEIRCE Gages for Every Gaging Need...



- HARDENED AND PRECISION GROUND PARTS
- STANDARD CAP SCREWS
- SPECIAL COLD FORGED PARTS
- SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST
- JIGS • FIXTURES
- STEAM HEATED PLASTIC MOLDS
- SPECIAL PRODUCTION TOOLS
- R-B INTERCHANGEABLE PUNCHES AND DIES
- DIE MAKERS SUPPLIES

ALLIED WITH MASS PRODUCTION

HIGH volume production at low cost . . . tolerances as close as are required for most machined parts . . . strength and durability . . . "on time" delivery . . . are guaranteed by Allied's experience in producing cold forged parts.

ALLIED PRODUCTS CORPORATION

DEPARTMENT 37
4612 LAWTON AVENUE, DETROIT 8, MICHIGAN

PRECISION · EXPERIENCE · DEPENDABILITY
ALLIED CORPORATION PRODUCTS

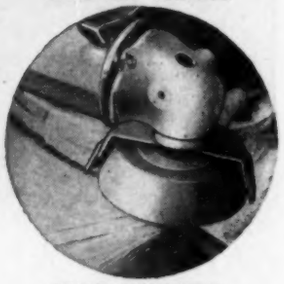
BLACK & DECKER
7" Standard Sander
also
7" Heavy-Duty
and
9" Heavy-Duty
Models

MORE USES *for Your* Black & Decker SANDERS!

You can't touch Black & Decker Portable Electric Sanders for versatility! With abrasive discs, they speed up sanding of any surface, from fast metal removal to satin-smooth finishing. With B & D "Whirlwind" Wire Cup Brushes, they take off old paint, rust, scale; clean castings, tanks, boilers, vats, sheet metal and soldered joints. With saucer grinding wheels, they grind any metal; smooth welds and casting ridges; grind off old rivets, studs, bolts; sharpen stationary machine blades. And, with rotary gouging and planing heads, Black & Decker Sanders shape and semi-finish lumber, working faster than jack plane and adz; remove stencil and brand marks from barrels and boxes.

See your nearby Black & Decker Distributor today for full information on these all-in-one Sanders. He's a good man to contact on any other tooling problem, too! For your free copy of our catalog, write to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland.

SAND ANY SURFACE



GRIND ANY METAL

SPEED WIRE BRUSHING

SHAPE ALL TIMBERS

"KOOLFLEX" BACKING PADS are light-weight, fabric-base, plastic-bonded discs which provide greater flexibility, cooler operation and longer life on sanding applications. Great for "feathering" finish, too!

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

How Reliance V★S can help *you*

meet the greatest challenge

industry has ever faced

WAGES go up and up, along with materials and other manufacturing costs. But to keep America prosperous, prices cannot be permitted to spiral to the point where large numbers of consumers are forced out of the market. How to prevent this presents the greatest challenge industry has ever faced.

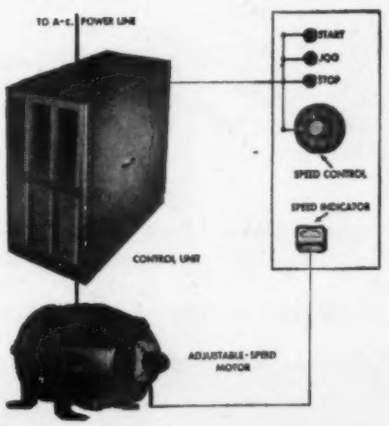
One sound answer is increased production through the use of more efficient machinery and methods. And this is where Reliance V★S can help you. *We have yet to find the industry where the V★S Drive cannot improve the quantity and quality of output, while lowering costs.*

A Reliance Application Engineer will survey your operations, then show you where and how you can benefit most through use of V★S—*the All-electric, Adjustable-speed Drive, operating from A-c. Circuits.* Just phone the nearest Reliance representative or write us direct for Bulletin 311.

RELIANCE ELECTRIC & ENGINEERING CO.
1075 IVANHOE ROAD • CLEVELAND 10, OHIO
Sales Representatives in Principal Cities

RELIANCE V★S DRIVE

Available in the Electronic System (1 to 5 hp.), in the Rotating System (1 to 200 hp.), or in a combination of both systems.



Reliance V★S Drive provides unlimited flexibility of machine operation. Starting, stopping, speed changing, reversing, maintenance of proper tension and other functions are exercised automatically or manually from nearby or remote stations.

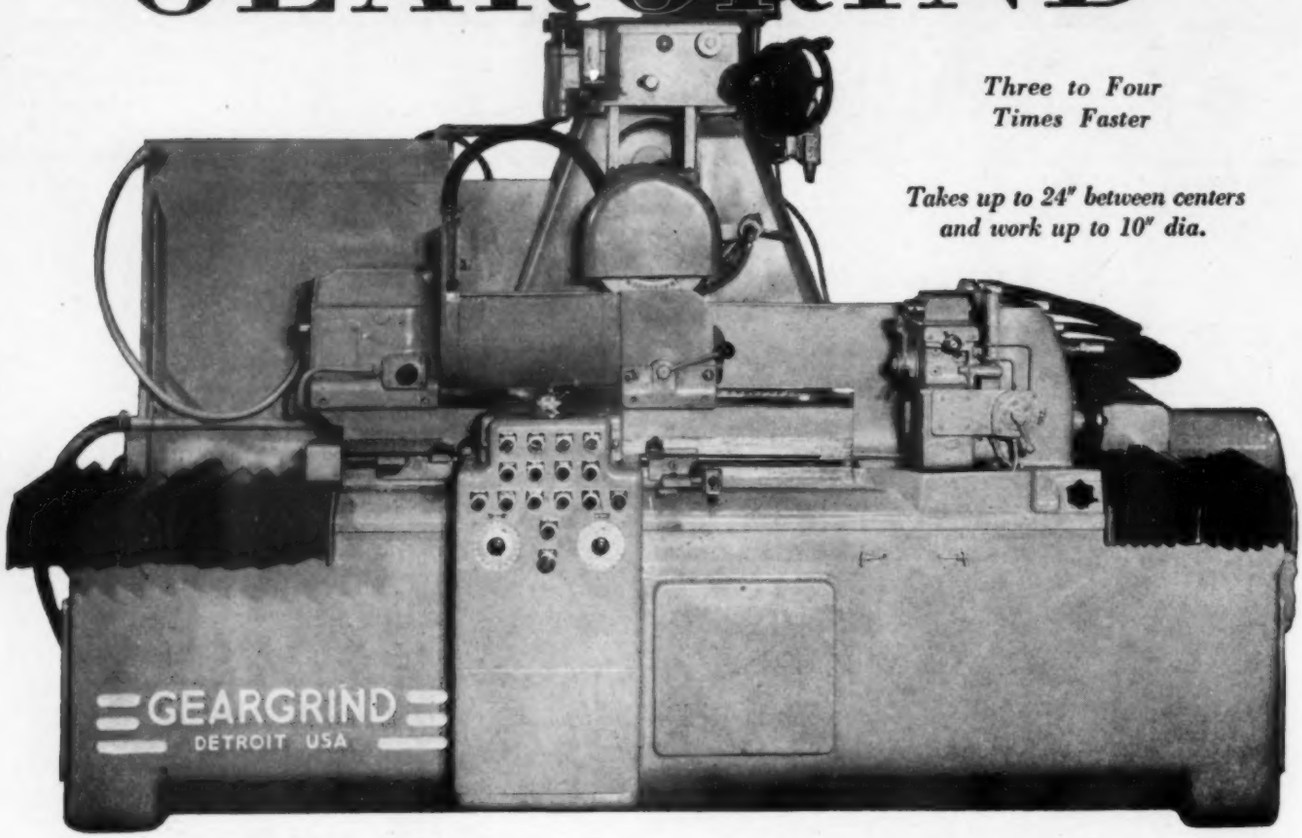
RELIANCE A-C D-C MOTORS

"MOTOR-DRIVE IS MORE THAN POWER"

The NEW
GEARGRIND

Three to Four Times Faster

Takes up to 24" between centers and work up to 10" dia.



With Automatic Wheel Feed

Work reciprocates past the grinding wheel, using a fast, short stroke. At each reversal point the grinding wheel feeds down, automatically.

Grinding continues on one tooth space until a "rough size" is reached, after which the work is indexed and the grinding wheel head re-set.

After a pre-set number of teeth have been "roughed out" the dresser moves into position for trueing the grinding wheel.

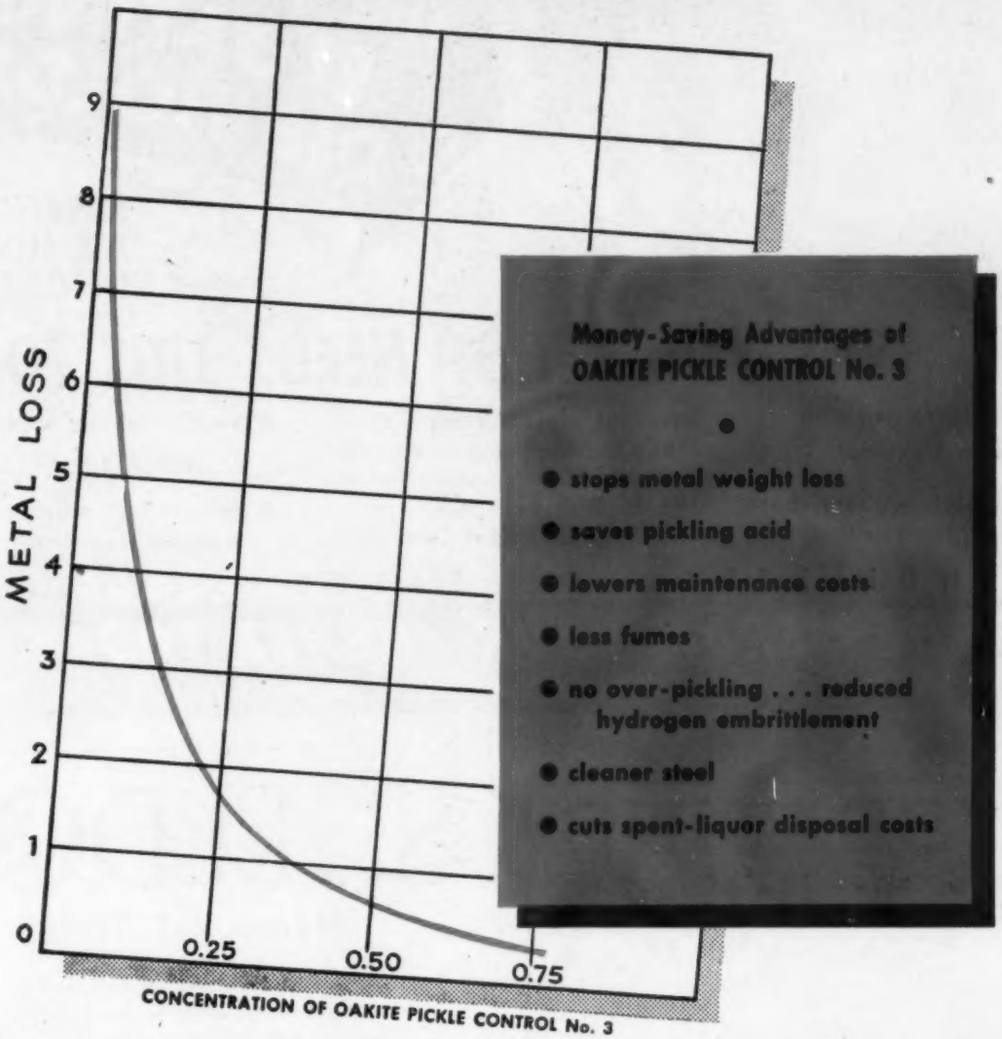
All these operations are automatic, and adjustments for number of teeth ground before dressing, total down feed and number of cuts is readily variable over a wide range.

Grinding by this new GEARGRIND method is done in ⅓ to ¼ of the time required by any previous gear grinding machine of comparable capacity.

WRITE for complete information.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

Curve* shows how Oakite Pickle Control No. 3 cuts your acid pickling costs



Oakite Pickle Control No. 3 for hot sulfuric pickling

Figure your pickling inhibitor costs in terms of tonnage saved, 'mucking out' charges reduced, extended life of acid solutions . . . and you'll find Oakite Pickle Control leading the field.

Oakite Pickle Control No. 3 more than pays its way. To its cost benefits, add these work-improving advantages: smooth, uniform pickling; the elimination of blisters on sheet or strip steel; the minimizing of "acid brittleness" in pickling wire. Performs efficiently and economically at concentrations of 0.5 to 1.0% by weight of the concentrated acid used in a pickling bath.

Write TODAY for detailed, free data on use and control, plus helpful information on pickling tank make-up. Or see the Oakite Technical Service Engineer nearby.

* curve shows relationship of metal loss (in grams per sq. decimeter per hr.) to concentration of Oakite Pickle Control No. 3 (percent by wt.); based on wt. of 100% sulfuric acid *Metal:* SAE 1035 *Time:* 1 hr. *Temp:* 180° F. *Acid:* 66° Be' sulfuric, 5% by volume.

OAKITE PRODUCTS, INC.
30H Thames Street, NEW YORK 6, N. Y.
Technical Service Representatives Located in Principal Cities of United States and Canada

OAKITE
Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

the Beverly FLOATING DIE HOLDER

3 FLOATING DIE HOLDERS IN ONE!

$13.50

HERE'S WHY YOUR SHOP NEEDS THIS TOOL!

- Short-run threading with Production Efficiency.
- Self-releasing, without shock to the work or the tool.
- Use your present stock dies. Made for 1½" standard button dies and includes adapters for 13/16" and 1" dies.
- Simple as drilling a hole.
- Straight shank will fit any ½" capacity chuck.
- Positive lock produces the required tension instantly.

AN INDISPENSABLE LATHE ACCESSORY

ORDER FROM YOUR JOBBER TODAY!

OR WRITE TO: BEVERLY BLACKSMITH, BOX NO 262 AURORA, ILLINOIS

KEYSEATING

The Modern Way

Illustration shows typical set-up for cutting taper keyway with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY

403 EXCHANGE ST. ROCHESTER 8, N. Y.

SHELDON

Makes ALL THREE

These 3 precision machine tools are a necessary part of every completely tooled shop . . . a modern precision lathe with "Zero Precision" tapered roller bearings that will retain its extreme accuracy at new high operating speeds . . . a convenient back-geared shaper that embodies all major design improvements . . . a capable small milling machine that will do accurate work . . . all three are extremely moderate in price.

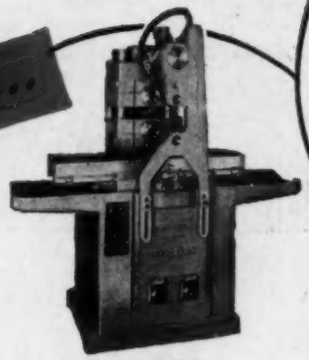
Write for Bulletins

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

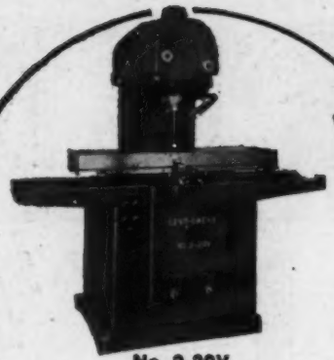
4234 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U.S.A.

Rugged...



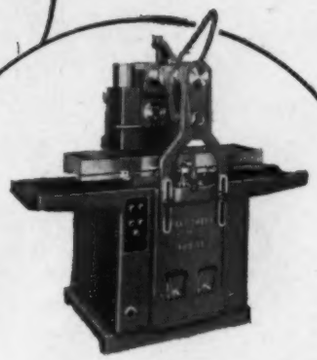
No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

Efficient...

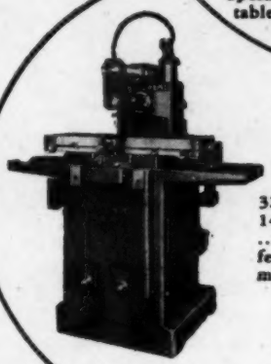


No. 2-20V
20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.

Simple...



No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.



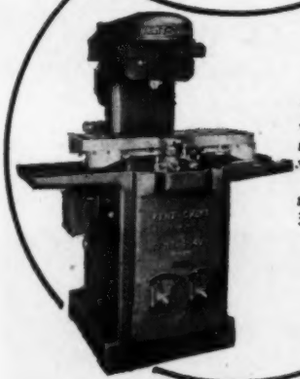
No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Standard
hydraulic and hand machines

KENT-OWENS

Milling Machines

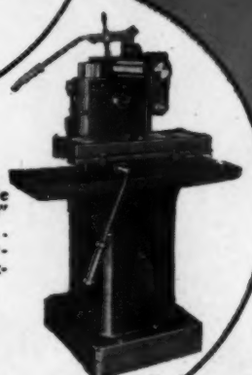
Write for Bulletins. Kent-Owens Machine Co., Toledo, Ohio.



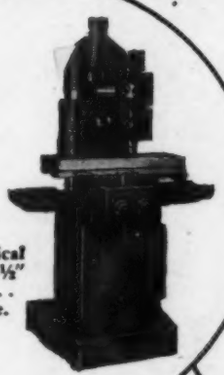
No. 1-14V
14" table travel with full automatic cycle . . . vertical spindle with speed range 115 to 3000 R.P.M.

KENT-OWENS REPRESENTATIVES

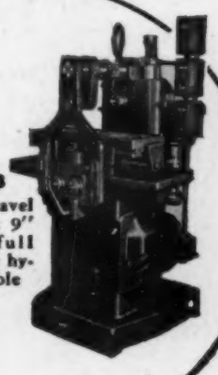
BOSTON — General Machinery Corp.
BUFFALO — Dan V. Patterson
CHICAGO — Neff, Kohlbusch & Russell
DALLAS — Hamilton-Moore Mach'y Co.
DAYTON — Geelgue Mach'y Company
DETROIT — A. C. Hohenstein Mach'y Co.
GRAND RAPIDS — Joseph Monahan
HOUSTON — Oliver H. Van Horn Co., Inc.
INDIANAPOLIS — Chris-Smith Machinery Co.
KANSAS CITY — Robison Machinery Co.
LOS ANGELES — Eccles & Davies Mach'y Co.
MILWAUKEE — Neff, Kohlbusch & Russell
MINNEAPOLIS — The Industrial Company
MOLINE — John J. Nesbitt Co.
MONTREAL — R. P. Barber Mach'y Co.
NEW ORLEANS — Oliver H. VanHorn Co., Inc.
NEW YORK — Hamilton-Wilcox-Boston Company
PHILADELPHIA — Colen Machinery Company
PITTSBURGH — Barney Machinery Company
ROCHESTER — P. W. Schuler Machinery Co.
SAN FRANCISCO — C. E. Bulmer Machinery Co.
ST. LOUIS — Blackmon & Nooncil Mach'y Co. Clarke Implement Company
SYRACUSE — J. P. Owens Mach'y Company
TORONTO — R. P. Barber Mach'y Company
WALKERVILLE — R. P. Barber Mach'y Company



No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . 1 H.P. . . . head counterbalance is adjustable.



No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.



No. 1-8
8" table travel . . . 25" x 9" table . . . full automatic hydraulic table feed.

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on Cast Bronze Bearings

Here is Good News for manufacturers of all types of equipment. Now you can secure all your requirements in cast bronze bearings . . . particularly in the larger sizes . . . in *days* . . . not months. Our new and enlarged facilities plus an ample supply of raw materials have made this excellent delivery possible.

On standard stock items . . . UNIVERSAL Bronze Bars, G.P. Bearings, Electric Motor Bearings . . . we can ship your order the day it is received.

Why not check your requirements NOW? Send us your prints and your specifications. Remember, Johnson Bronze makes every type of Sleeve Bearing . . . an unfailing source of supply with the highest reputation for quality. Write, wire or call—TODAY.

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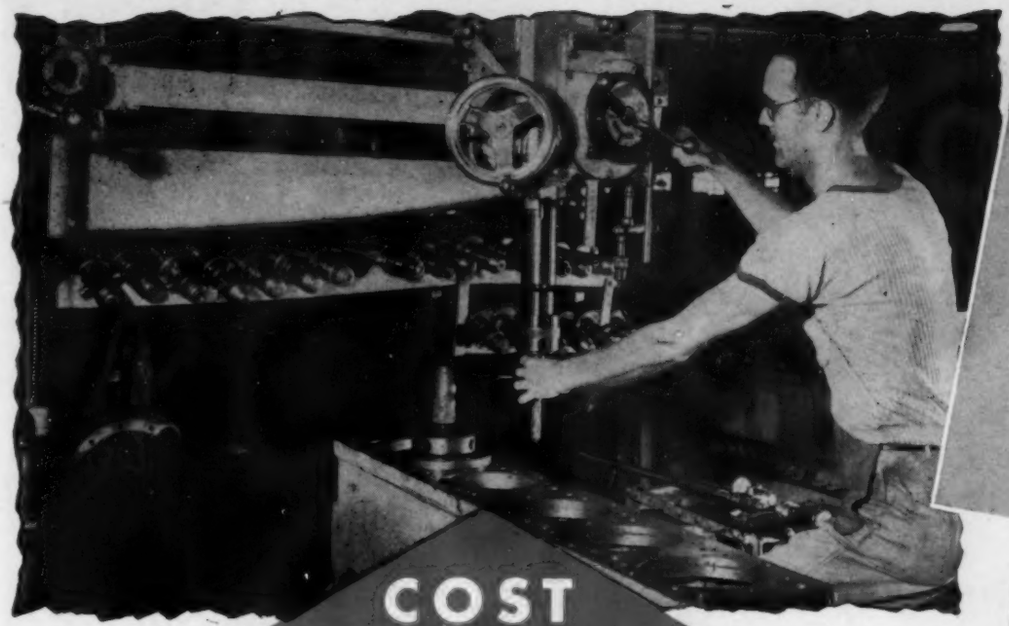
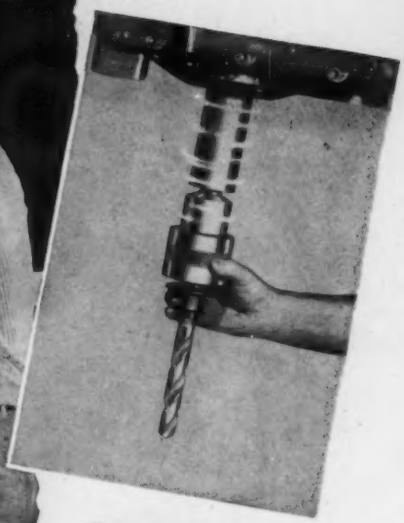
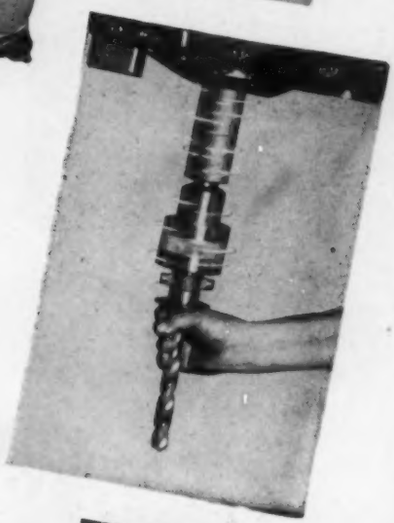
JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS







COST CUTTING TOOLS

McCROSKY

Wizard QUICK-CHANGE CHUCKS

...more pieces per hour at lower cost per piece

● There's no stopping—or even slowing down the spindle for tool changes when you use Wizard Quick-Change Chucks. To release the tool the operator simply grips the chuck lightly with his thumb and forefinger, and the collet drops out into his hand. The next tool and collet, are then pushed up into the revolving spindle and is automatically centered and locked rigidly in position—speeding up production and cutting costs. Try Wizards once and you'll never be without them. Furnished in four sizes. Bulletin No. 17-C gives full details. Send for a copy!

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock Milling Cutters
Super Adjustable Reamers
Block Type Boring Bars
Turret Tool Posts
Wizard Quick-Change Chucks
Special Multiple Operation Tools

Logan A NAME TO REMEMBER

WHEN YOU THINK OF better LATHES AND SHAPERS

Quick Change Gear Cabinet Lathe

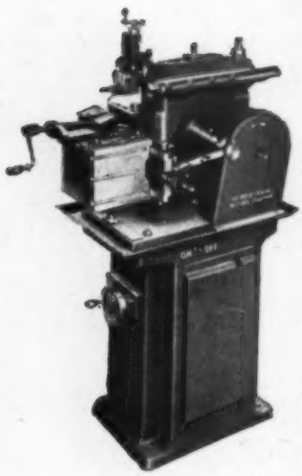
Swing Over Bed, 10½". Distance between Centers, 24".

NO ADVANCE IN PRICES

During the war years, prices in general advanced more than 40%. During the same period, Logan Lathe prices averaged approximately 15% increase, in spite of improvements in design and construction. Our enlarged plant, equipped with the most modern machinery makes for production savings which are passed on to the users of Logan Lathes. That is why even with recent material and labor cost increases, Logan Lathe prices remain unchanged.

Logan Lathe prices start at $159.50

LOGAN LATHES SAVE MONEY



LOGAN 7" SHAPER

Price naturally, has a bearing on the lathe you buy. Yet the low Logan price tag is only a one-shot saving. It is multiple, on-the-job savings, as well as price that makes Logan the lathe of true economy.

Logan on-the-job economies result from the way the Logan Lathe is designed and built. For example, due to its ball bearing spindle mounting, the Logan Lathe is ready for any operating speed from 30 to 1450 rpm, with no bearing adjustment. V and flat bed ways are machined to within .0005" of parallelism. Headstock bearing faces are held to an accuracy of .0005". Rugged, massive construction is combined with this accuracy, and vital wear points are protected by self lubricating bronze bearings. Consequently, even after years of constant use, a Logan Lathe retains power for heavy cuts, speed for low cost parts production, and accuracy for exacting tool room work. In many plants, batteries of Logan Lathes handle all medium and small work, saving in power costs, set-up time, and reduced rejects. In any shop, large or small, Logan sustained accuracy and versatility save time, materials, labor and money. See the complete line of Logan Lathes and Shapers at your near-by Logan dealer's, or write direct for catalog information.

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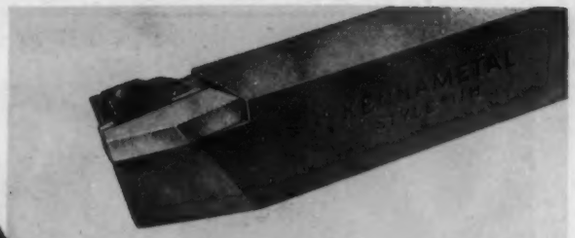
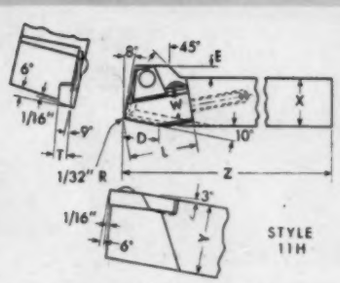
AA-1

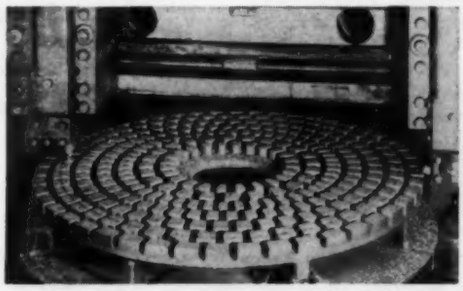
LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

IF Interrupted Cuts Are Your Problem Learn About Kennametal

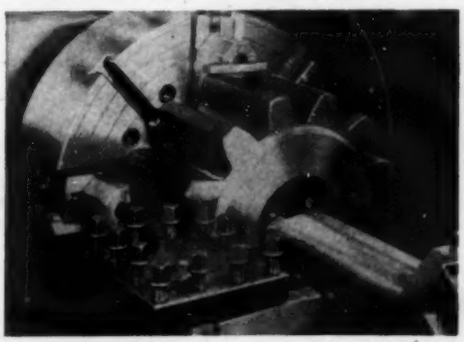




Style 11H is one of a complete line of Kennametal tools, having sturdy, clamped-in, advanceable Kennametal tips. This assembly—developed by Kennametal—is highly successful on interrupted cutting, and is equally outstanding on continuous-cut operations. It utilizes Kennametal's high strength to best advantage—provides a thermally-strain-free assembly; makes possible deep cuts and heavy feeds; simplifies grinding since tip is advanced and re-sharpened without removing any steel from shank; and enables practically all of the Kennametal tip to be utilized for cutting.



This iron casting has 288 chilled lump interruptions. A Kennametal standard Style 11T80 tool faces and turns it at 190 ft./min., .048" feed, and ¼" depth of cut.



Kennametal bores, turns, and faces over interruptions and sand holes on this chrome-nickel steel rack pinion. Speed—155 ft./min.; feed—.032"; depth of cut—¼" to 5/16". Performance is 5 to 1 over high speed steel tools in production and pieces per grind.

You're probably enjoying the advantages of carbide tooling on continuous-cut operations—but how about interrupted cutting?

Has this given you tool trouble, and made you resort to slower machining methods on some important jobs?

If so, Kennametal will help you solve this problem. Its ability to withstand the shock of interrupted cuts, on both cast iron and steel, has been unequalled.*

Although cutting conditions are often improved by changing the tool shape so that the shock will be imposed on a section of the tip that is stronger and better supported, it is still the carbide that must take the punishment. Here's where Kennametal has a distinct advantage.

Because of exclusive processing methods and careful control in manufacture Kennametal's impact strength is unusually high for such a hard material—as great as that of hardened alloy steels having much lower hardness and compressive strength.

Still further advantages for interrupted cutting are obtained by the use of mechanically-held tools developed by Kennametal Inc. Tips of characteristically high impact strength are securely clamped to, and firmly supported by a heat-treated steel shank, to provide an exceptionally strong strain-free assembly.

If you have had difficulty with carbide tools on interrupted cuts, let us engineer Kennametal to the solution of your particular problem.

**Ask us to send you a set of Performance Reports that demonstrate the superior results obtained with Kennametal Tools on interrupted cutting.*

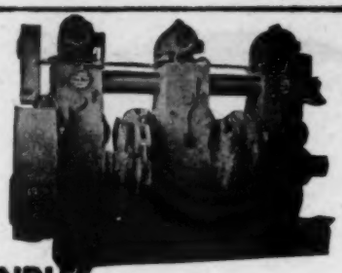
KENNAMETAL Inc.

Trade Mark Reg. U. S. Pat. Off.

LATROBE, PA.

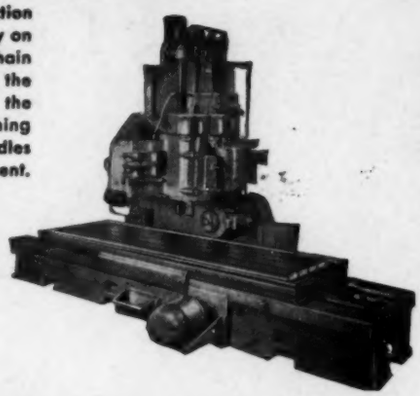
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION

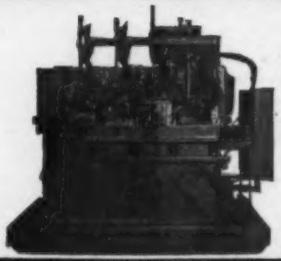
Roto-Matic MILLERS

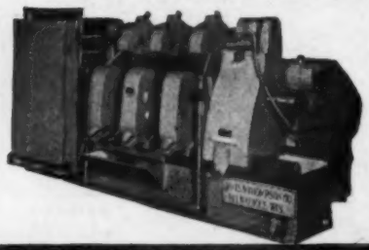


ROTARY DRUM TYPES •
VERTICALS • SINGLE AND MULTIPLE SPINDLES
PLANERS • RISE AND FALL • VERTICAL INDEXING

The ROTO-MATIC principle of continuous production insures the maximum of production and accuracy on any job to which a Miller has been adapted. Chain clamping mechanisms, where adapted, leave the operator free to load and unload parts. On the larger type Rotary Drum Type Millers finishing spindles are adjustable for toe cut. All spindles have provisions for micrometric endwise adjustment.







MILLING • DRILLING • REAMING • BORING • PIPE THREADING • SPECIAL MACHINES

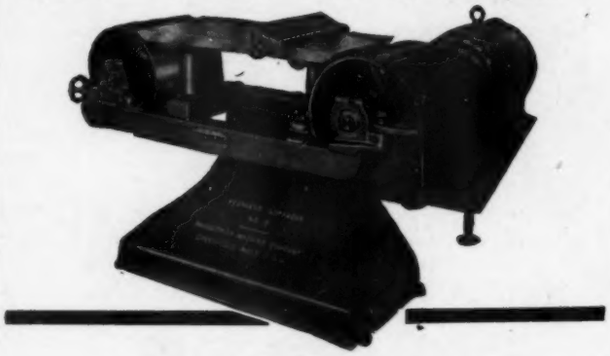
DAVIS & THOMPSON COMPANY

MANUFACTURERS MACHINE TOOLS, MICROMETERS AND GAGES

MILWAUKEE WISCONSIN

THE ABBOTT BALL COMPANY • HARTFORD 10, CONN.

No. 2-14" "PEERLESS" Horizontal SURFACERS



Eliminate hand sanding and filing the modern way

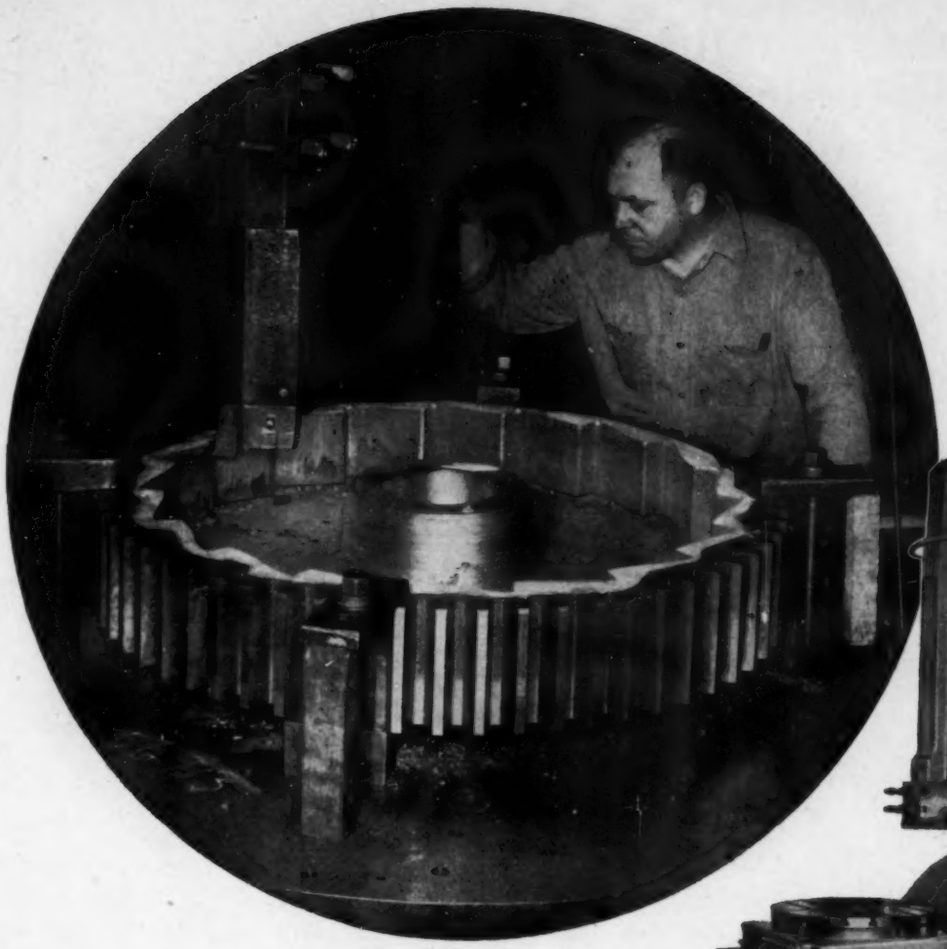
Recommended for grinding and sanding flat surfaces of wood, metal, hard rubber, celluloid and molded compositions. Finer quality work and increased production are assured where these machines replace slow, laborious hand methods. Furthermore a straight grained finish results in savings in both time and material.

SPECIFICATIONS

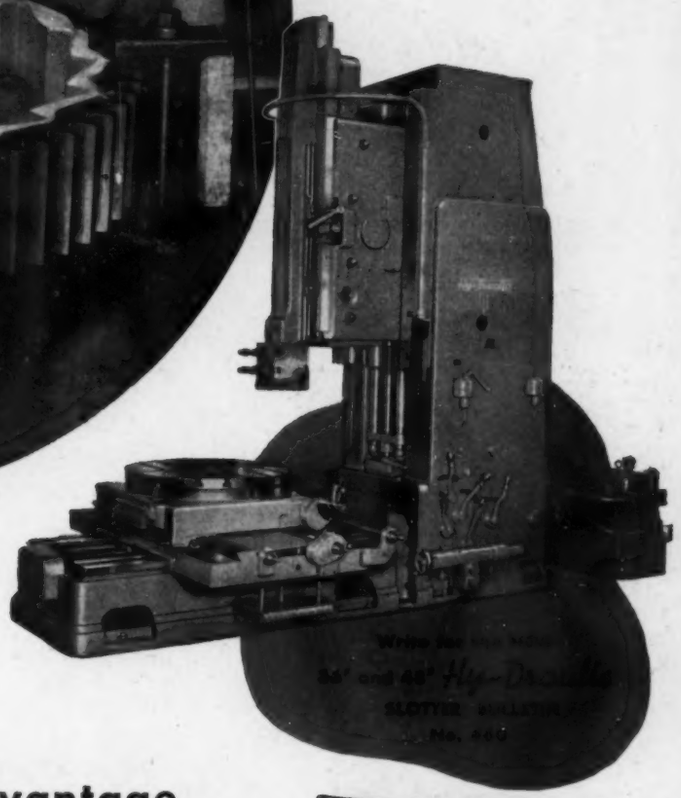
Abrasive Belt—14" wide x 11'1" long
Height 39"
Width 49"
Length 60½"
Floor to top of belt table 36¼"
Belt Table—15⅝x35"
Work size—30" long

Write for illustrated literature.

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS U.S.A.



Typical Rockford Hy-Draulic Slotter job . . . cutting ratchet teeth on large gear for ladle crane. The three types of Hy-Draulic power feed available on all Rockford Slotters were used . . . longitudinal, transverse and rotary; in addition the rotary motion for tooth spacing was indexed by the dividing head. Material cut was .55 carbon cast steel.



FAST SET-UP ALWAYS

a Rockford *Hy-Draulic* advantage

Whether you require a Shaper, Planer, or the 36″ Slotter illustrated above, fast set-up is an advantage you will obtain with every Rockford Hy-Draulic machine. Hydraulic design results in simplified positive controls . . . in ram or table travel that is accurate and immediately responsive to the machinist's needs. The time saved in set-up is one of the important economies provided by all Rockford Hy-Draulic machines. In addition you always have the advantages of wide range, infinitely variable speeds and feeds . . . and the smoothly applied power of the Hy-Draulic system for fine finish on work and protection to tools. Write for complete information on the Rockford Hy-Draulic Shapers, Planers, Slotters, and Shaper-Planers. Ask for Catalog 1947.

ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

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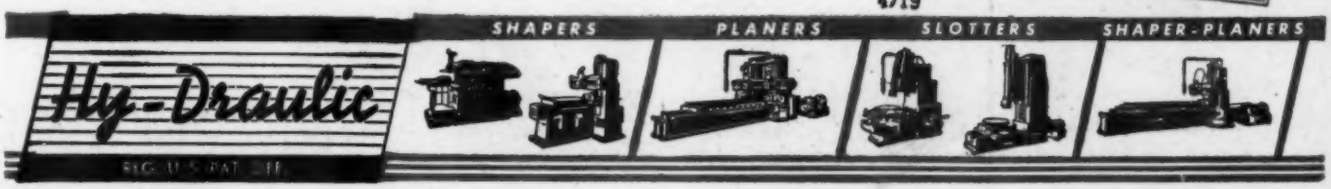


If Your Specifications Call for Accurate Holes in Steel . . . Cast Iron . . . Bronze . . . Aluminum Carbides . . . Glass or Ceramics

THE SUNNEN PRECISION HONING MACHINE

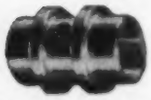
Will Save Set-Up Time, Increase Production, Reduce Rejects, Hold Tolerances to .0001".

Typical Jobs

Sunnen Precision Honing Machine produces uniformly smooth accurate hole in glass part.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

A straight round hole was produced in ceramic material.



Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.

Drawing and Blanking Die. "Saves time in producing smooth base metal finish."

The Sunnen Precision Honing Machine provides real savings in long run production costs and even greater savings on job lots and short runs when frequent size changes are necessary.

This machine can be set up quickly and easily. Often short runs can be completed faster than set-ups can be made on other machines.

The Sunnen Precision Honing Machine produces straight round holes with full bearing surfaces in any hole from .120" to 2.625" in diameter. Duplicates sizes quickly and easily. Straightens and rounds imperfect holes with minimum stock removal. Corrects heat-treat and chucking distortion. Removes burrs and flash from drilled, machined, cast or punched parts. Is easy to operate—no jigs or fixtures are needed. Is low in cost and economical to operate.

Find out how Sunnen Honing can help you save time and money on small hole finishing costs. Call in a Sunnen engineer or write for bulletin giving complete information.

SUNNEN

TRADE MARK REG. U. S. PAT. OFF. • MARCA REGISTRADA

SUNNEN PRODUCTS COMPANY

7941 Manchester Ave. • St. Louis 17, Mo.

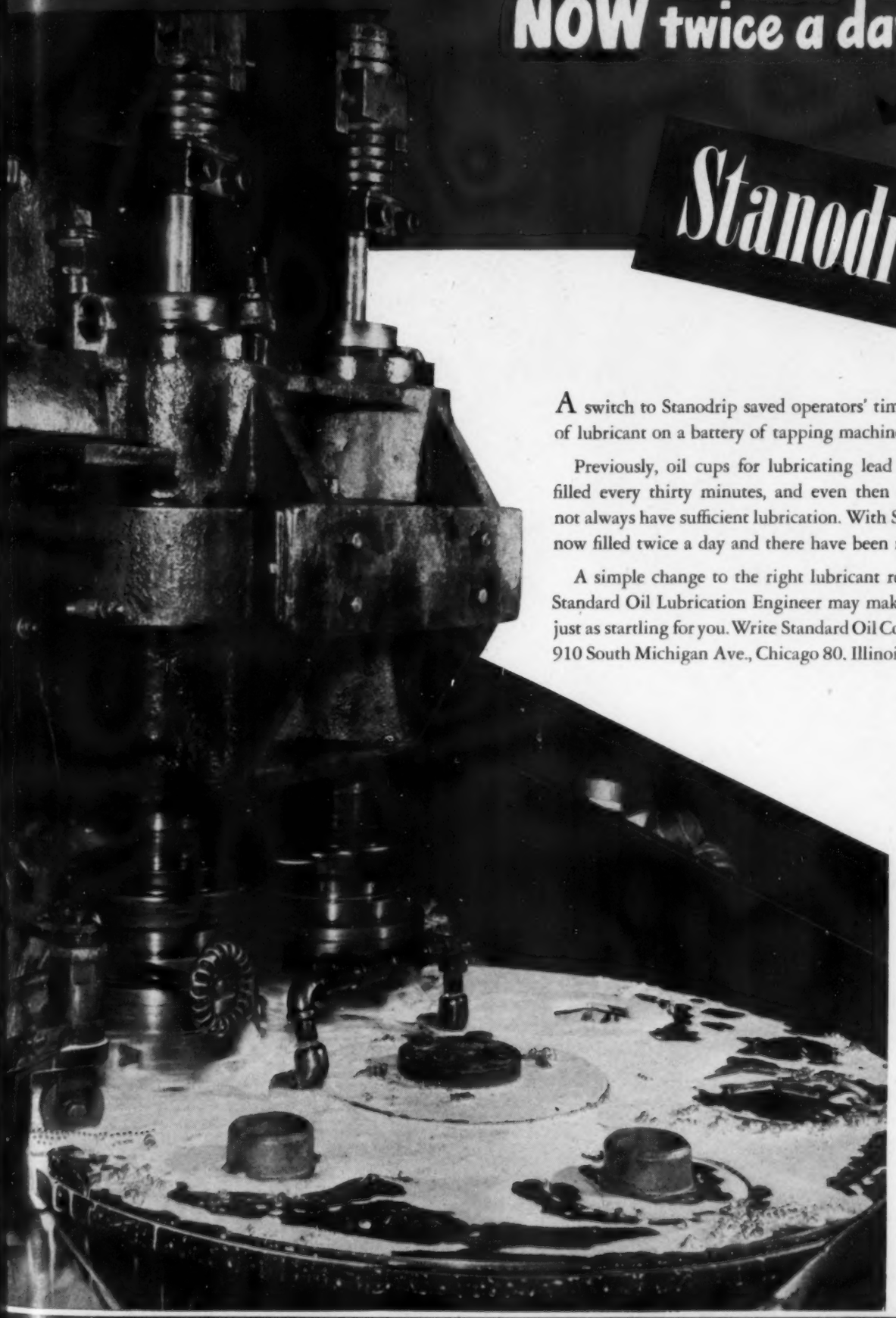
Canadian Factory: Chatham, Ontario

275

Lead screws were oiled every 30 minutes . . .

NOW twice a day with

Stanodrip



A switch to Stanodrip saved operators' time and up to 75% of lubricant on a battery of tapping machines.

Previously, oil cups for lubricating lead screws had to be filled every thirty minutes, and even then the machines did not always have sufficient lubrication. With Stanodrip, cups are now filled twice a day and there have been no failures.

A simple change to the right lubricant recommended by a Standard Oil Lubrication Engineer may make savings that are just as startling for you. Write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois, for an Engineer.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Get Clean Compressor Valve Operation With . . .

STANOIL

Excessive deposits on compressor discharge valves troubled a midwest lumber manufacturer. A new intake air filter failed to stop deposit formation. The operator was almost convinced that shutdowns for valve cleaning could not be avoided. But he took the suggestion of a Standard Oil Lubrication Engineer and tried Stanoil.

That was five years ago. Since then, he has not had a forced shutdown to clean valves. On a routine inspection, after seven months' operation (2,700 hours), valves were found to be free from deposits—just as they appear in the photographs.

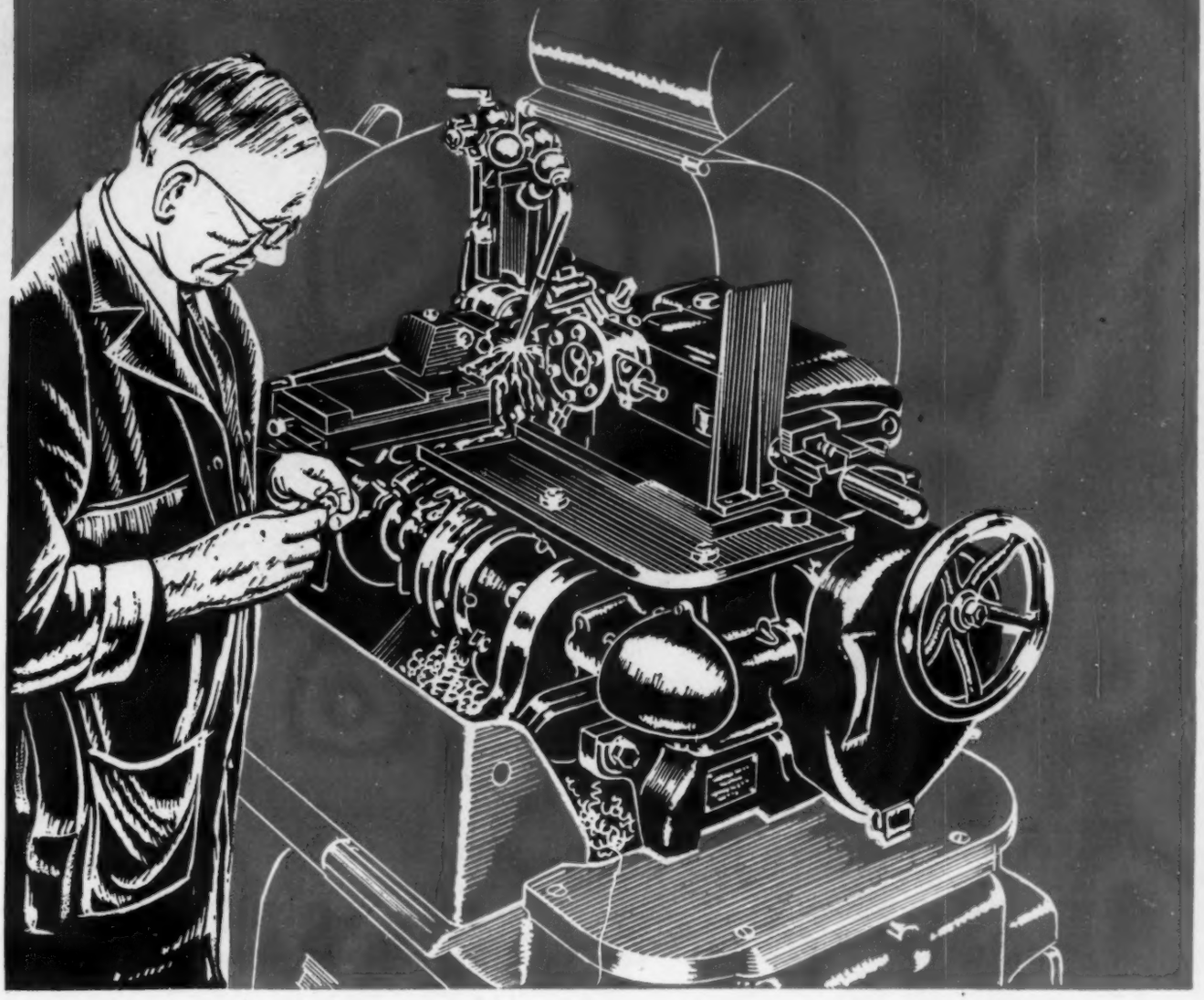
These four discharge valves are shown just as they came from the compressor after 7 months operation (2,700 hours). The close-up view above shows how clean the valves were.

Even a short run will convince you that oxidation-inhibited Stanoil is an ideal compressor lubricant. Arrange to have a Standard Oil Lubrication Engineer help you test it. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

STANDARD OIL COMPANY (INDIANA)

STANDARD SERVICE

TYCOL DUAL-PURPOSE
ONE OIL—TWO JOBS FOR PRODUCTION ECONOMY



...for cutting and lubrication

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Tide Water Oil Company of Canada, Ltd. · Toronto, Montreal

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An excellent machine lubricant...
Corrosion is banished . . .
Increased tool life . . .
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Such outstanding results are the rule — not the exception . . . when a Tycol Dual-Purpose Oil is used . . . the one versatile oil that does the work of *two* oils better and more efficiently. Call, write or wire your nearest Tide Water Associated office for full details.

LUBRICATION—"ENGINEERED TO FIT THE JOB"

... the trend is toward

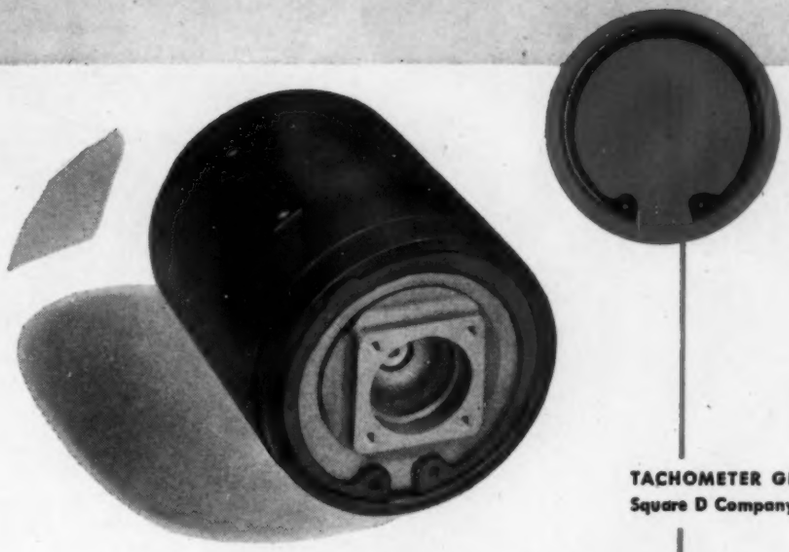
JESSOP *Cast-to-Shape* STEELS

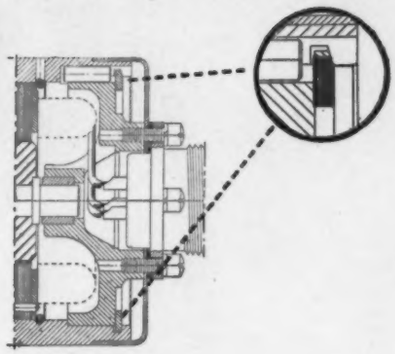
The increasing demand for JESSOP Cast-to-Shape Tool Steels is positive proof of their outstanding advantages to industry. Because they are furnished in the shape in which they will be used, JESSOP Cast-to-Shape Tool Steels require only a minimum of finish machining, thus accomplishing important savings in labor, material, and processing costs.

JESSOP Cast-to-Shape Tool Steels can be supplied in analyses to meet the requirements of a high percentage of tool steel applications. Write and tell us what you need . . . we can make it for you.

JESSOP STEEL COMPANY
WASHINGTON, PENNSYLVANIA

Truarc Beveled Ring takes up end-play, eliminates shims, saves 20 minutes' assembly time





TACHOMETER GENERATOR—Kollsman Instrument Division, the Square D Company—showing Waldes Truarc Beveled Retaining Ring.

When installed in a groove with a corresponding bevel, the tapered edge of the Beveled ring acts like a wedge and rigidly bridges end-play. End-play can also be taken up resiliently by another type Truarc ring—the Bowed.

Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. All Truarc rings are precision engineered, easy to assemble and dis-assemble, always circular to give a never-failing grip. They can be used over and over again.

See what can be done for your product: send a drawing to Waldes Truarc Technical Service Engineers for individual attention without obligation.

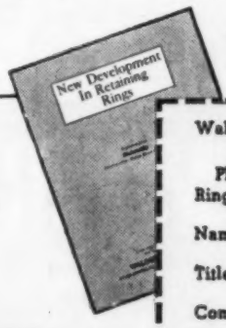
One Waldes Truarc Beveled Retaining Ring gives Five big advantages:

- Secures the cover with its connecting parts in the housing against strong pressure, heavy vibration
- Absorbs accumulated tolerances up to .010 (ring diameter is 1.9375)
- Eliminates shims, saves material and weight
- Saves 20 minutes' assembly time
- Simplifies field maintenance by facilitating quick dis-assembly, re-assembly

WALDES
TRUARC
Reg. U. S. Pat. Off.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK
Canadian Distrib.: Controlite Engineering & Sales Ltd., 20 Bloor Street W., Toronto 5



**Mail this coupon today for your copy of "New Development in Retaining Rings"*

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Long Island City 1, N. Y.

Please send booklet, "New Development In Retaining Rings" to:

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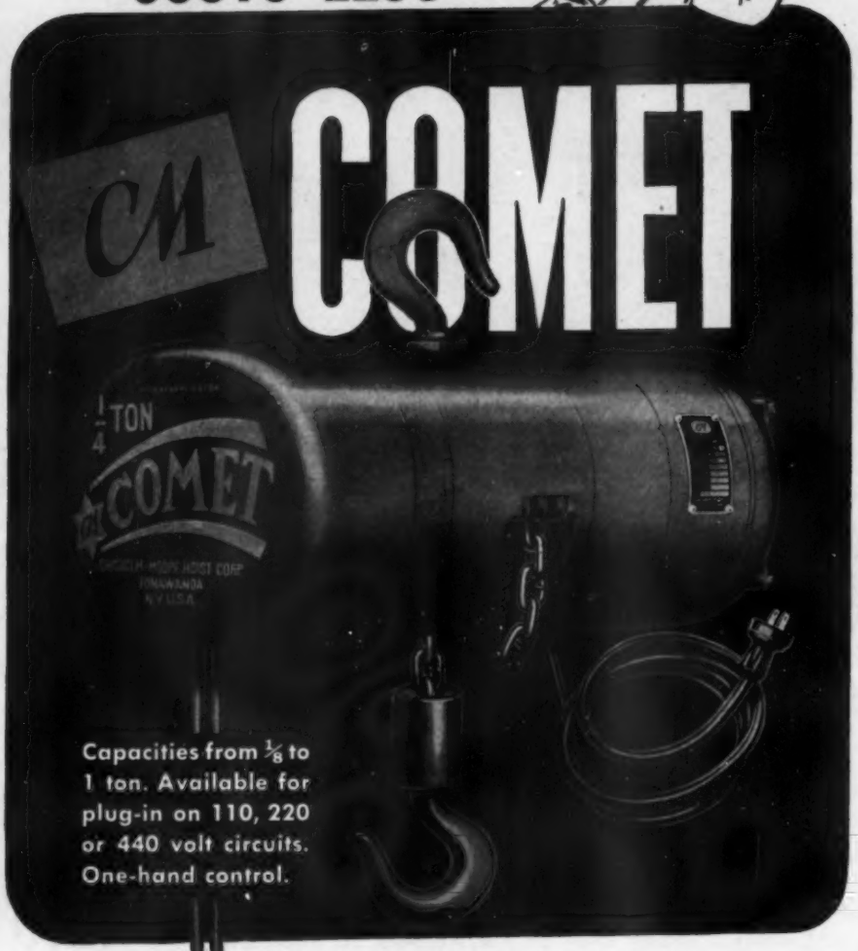
WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,302,948; 2,026,404; 2,416,852 AND OTHER PATS. PEND.

Electric Hoist-Power COSTS LESS

CM COMET



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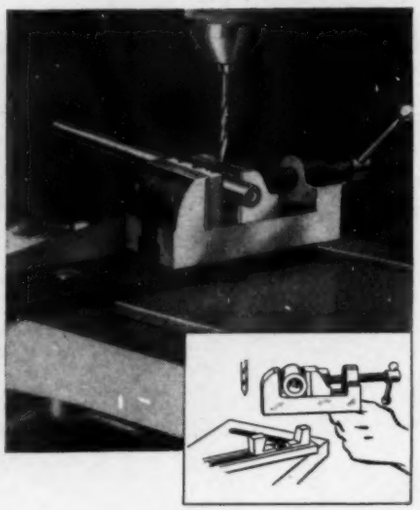
"YANKEE" VISE
and Vise Clamp



short cut set-ups

Just one set-up securely aligned and held in a "Yankee" Vise. Lift it off swivel base on bench and set it on "Yankee" Vise Clamp on face plate of drill press. Sides, bottom and front end accurately machined. Grooved V-block for gripping rounds and irregular shapes. Sturdy, accurate tool for keeping jobs simple and easy. Your industrial distributor likes to sell "Yankee" Tools because they're "willing tools" that make friends. No. 1993 "Yankee" Vise and No. 2993 "Yankee" Vise Clamp illustrated.

Write today for illustrated "Yankee" Tool Book.

YANKEE TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

It's sure to be a box office hit for all exhibitors at the Tool Engineers' Industrial Exposition in Cleveland, Ohio, next March 15-19!

Highlights: Presented by the American Society of Tool Engineers, the last Exposition drew thousands of top executives, industrial engineers and tool engineers. A record we're proud to claim! (We'll top even that next spring.)

Action: Among those who will attend the Exposition next March will be the "men who count" in industry . . . men who dictate what shall be bought and from *whom*. There's sure to be sales action aplenty—(your competitor will most likely be there)—so bring your top engineers!

Drama: New processes, advanced methods, fresh approaches and inspiring ideas . . . provide drama by America's leading manufacturers. Plant tours, technical meetings, industrial movies, exhibits—all add up to ASTE's most spectacular Industrial Exposition yet!

Extra Program Feature

Coincidental with the Exposition, ASTE members will meet for their 16th Annual Convention and technical sessions in Cleveland. It's your big chance to sell the tool engineer . . . so make it a date for '48!

Preview of coming attractions!

TIME: March 15-19 • PLACE: Public Auditorium, Cleveland, Ohio • PRODUCED BY: American Society of Tool Engineers • DIRECTED BY: America's leading manufacturers • STAR PERFORMERS: All Tool Engineer Industrial Exposition exhibitors • PRICE: No advance in prices • RESERVATION: Write immediately.

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For complete information, write

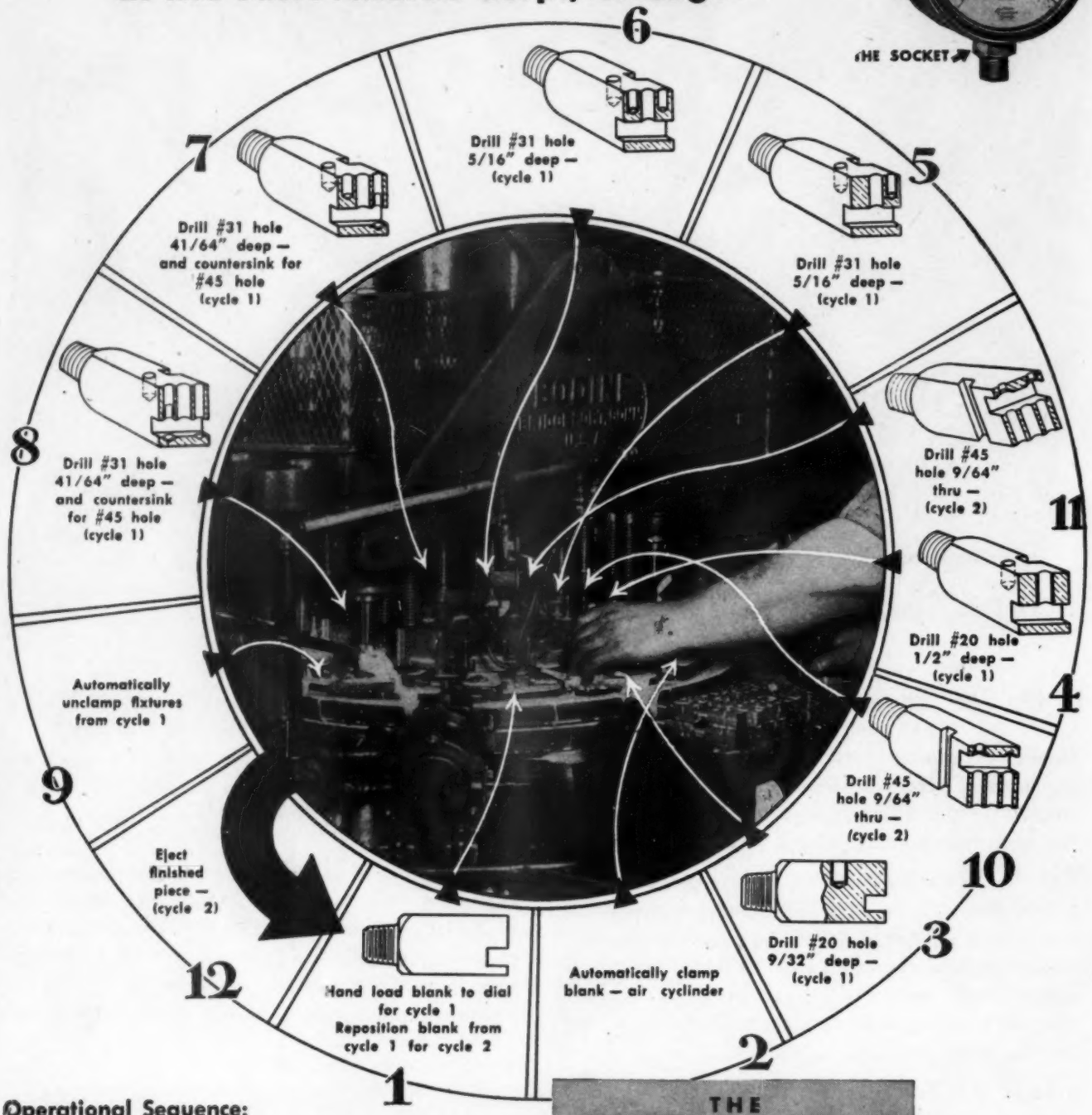
EXPOSITION COMMITTEE

AMERICAN SOCIETY OF TOOL ENGINEERS

1666 PENOBSCOT BLDG.
DETROIT 26, MICHIGAN

Bodine...CASE HISTORY No. 18

Processing a Brass Gauge Socket at the Jas. P. Marsh Corp., Chicago


6
Drill #31 hole 5/16" deep — (cycle 1)
5
Drill #31 hole 5/16" deep — (cycle 1)
11
Drill #45 hole 9/64" thru — (cycle 2)
4
Drill #20 hole 1/2" deep — (cycle 1)
10
Drill #45 hole 9/64" thru — (cycle 2)
3
Drill #20 hole 9/32" deep — (cycle 1)
2
Automatically clamp blank — air cyclinder
1
Hand load blank to dial for cycle 1 Reposition blank from cycle 1 for cycle 2
12
Eject finished piece — (cycle 2)
9
Automatically unclamp fixtures from cycle 1
8
Drill #31 hole 41/64" deep — and countersink for #45 hole (cycle 1)
7
Drill #31 hole 41/64" deep — and countersink for #45 hole (cycle 1)

Operational Sequence:

This Bodine set-up employs 8 spindles. The part is repositioned in the dial for a second pass (cycle 2) under the spindles to complete all operations.

Production:

One piece is completed per stroke of the machine, 700 pieces per 50 minute hour . . . a total of 5600 operations. Maybe YOU can use a Bodine to reduce production costs.

THE
Bodine
CORPORATION
BRIDGEPORT 5, CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING TAPPING, AND SCREW INSERTING MACHINES

Fixed Nuts Stay Put–BUT

Even if your bolted assembly needs a fixed nut–remember that vibration and wear will loosen all other parts unless you use a strong spring washer to expand and hold all parts tight as wear occurs.

True, a good fixed nut will not move up or down on a bolt;–but the other parts of bolted assemblies inevitably loosen because of bolt stretch, the frictional wear of metal on metal, burrs, flares, and the pulverizing of paint, scale and rust.

A live spring washer–a long-range spring washer–is absolutely essential if you expect your whole assembly to be held tight as wear occurs. The expanding spring action keeps up the pressure on all parts as friction loosens them.

No matter what kind of nut you use–fixed or standard–be sure to specify a Kantlink spring washer. There is no substitute.

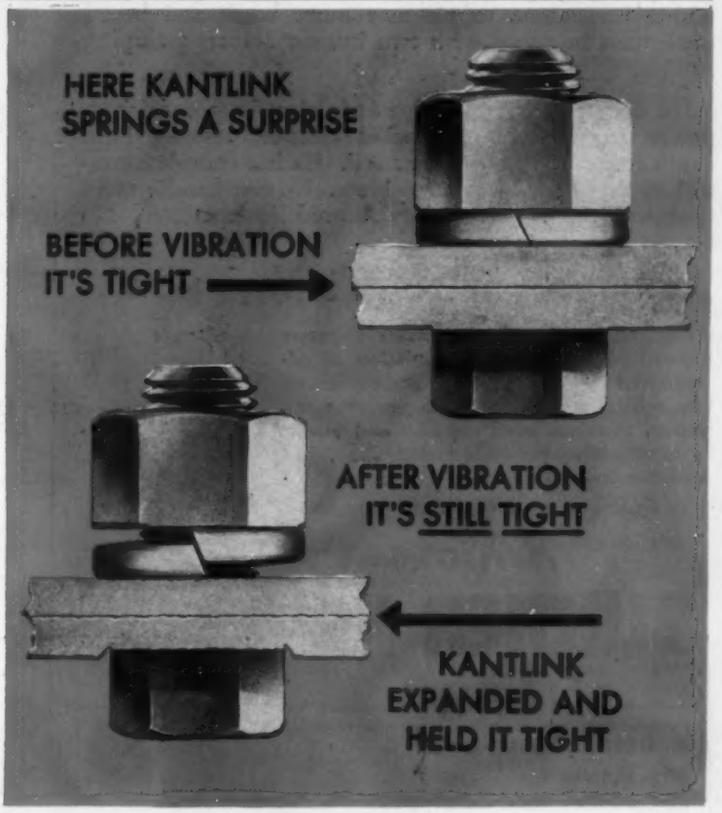
Originators of Kantlink the long-range spring washer.

Originators of

KANTLINK TRADE MARK

the long-range spring washer

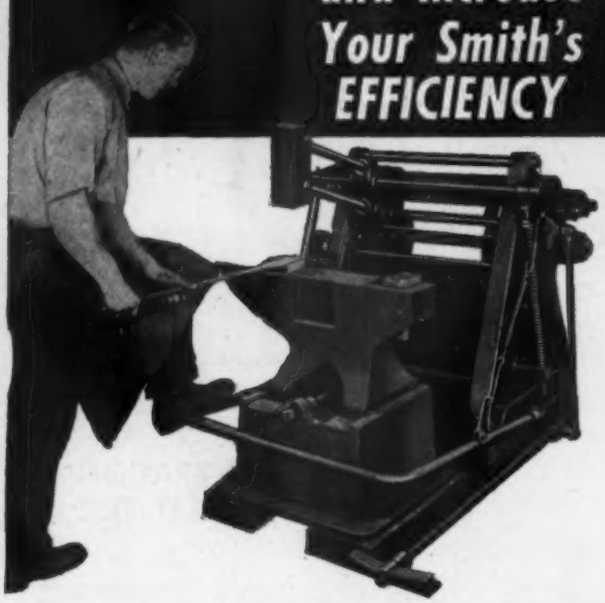
Let's Spike the Nut to prove our Point
Here no Spring Washer is Used
BEFORE VIBRATION IT'S TIGHT
AFTER VIBRATION IT'S LOOSE
The Nut never moved— but the parts wore loose


HERE KANTLINK SPRINGS A SURPRISE
BEFORE VIBRATION IT'S TIGHT
AFTER VIBRATION IT'S STILL TIGHT
KANTLINK EXPANDED AND HELD IT TIGHT

THE NATIONAL LOCK WASHER COMPANY

Newark 5, New Jersey — Milwaukee 2, Wisconsin

MODERNIZE YOUR BLACKSMITH SHOP and Increase Your Smith's EFFICIENCY



When you install a McKiernan-Terry Blacker Hammer, you make your smith three times as efficient. You enable him alone to produce more work and better work than he could with two human helpers swinging sledges.

He operates this direct-geared, electric-motor-driven power hammer by foot-pedal control, leaving both hands free for work on the anvil. He has complete control of speed and weight of blow. He can handle more operations per heat. No confused instructions. No wasted motions.

THIS *FREE* BULLETIN SHOWS HOW

Get full information in Blacker Hammer Bulletin No. 56. Concise tabulation of advantages; specifications; diagrams. Shows why a Blacker Hammer saves you time and money, increases anvil capacity and output by modernizing your blacksmith shop. Just send the coupon for your copy.

McKiernan-Terry

BLACKER HAMMER

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Assembly Costs Slashed 25%

64 SPEED NUTS on each "Electro" Cigarette Vending Machine *Boost* Production and *Reduce* Assembly Costs.

Push-on type SPEED NUTS are used over die cast studs as shown at left, to attach medallion and delivery compartment bezel, and for other fastening jobs not visible in photo. C7000 flat type SPEED NUTS are used to attach hinges to top cover, bottom frame and doors.

Mr. M. Caruso, President of C-Eight Laboratories, Newark, New Jersey, has this to say about SPEED NUTS:

"Further experiments increased the use of SPEED NUTS in assembling our "Electro" All-Electrical Cigarette Vending Machine. Since this change over, a study of our costs reveals a *saving up to 25%*. We feel sure that more and more Tinnerman fasteners will be used on our equipment and will set a standard of quality and perfection for the ultimate user."

We're sure we can help you produce a better product at lower cost. Write us about your assembly problem today.

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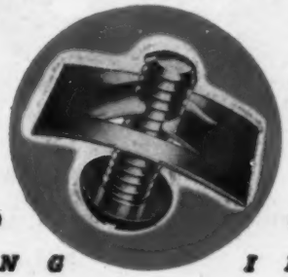

Speed Nuts* PATENTED

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MORE THAN 4000 SHAPES AND SIZES

FASTEST THING IN FASTENINGS

Apex has the right bit for YOU

Whether you use Phillips, Frearson, Clutch Head, Slotted, Allen or Hex Head Screws and no matter what make of electric, air or spiral drivers you use—Apex has the *right* bit for YOU.

Apex bit holders and insert bits do a big job with a minimum inventory. Just obtain the bit holders you need (they last indefinitely) then order tips (of whatever type you need) and discard them as they wear out. Interchangeable insert bits are furnished for all types of screws.

The useful life of the one-piece bits for Phillips and Frearson recessed screws is far from over when they become worn by long use. You can increase their service life through Apex Reconditioning Service—which restores the bits to their original condition at a considerable saving over the cost of new bits. Write for Catalog No. 20.

APEX

Screwdriver Bits

THE APEX MACHINE & TOOL COMPANY, 1030 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks • Quick Change and Positive Drive Drill Chucks • Vertical Float Tapping Chucks • Parallel Floating Tool Holders • Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws • Hand Drivers for Phillips and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches

STANDARD ENGINEERS NOTEBOOK

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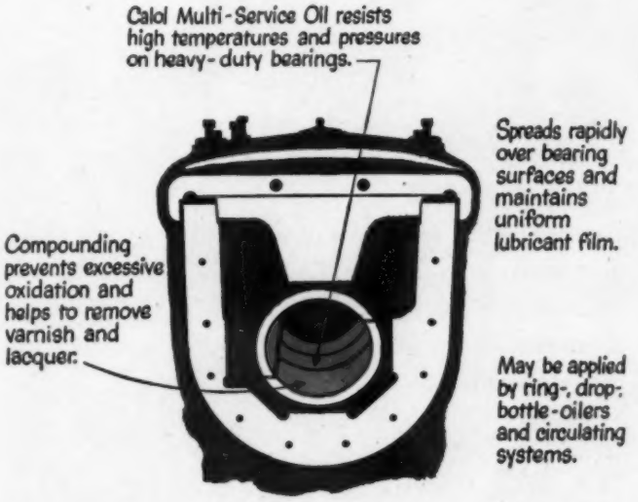
Because it is made of high-quality stable oils and contains detergent and oxidation-resistant compounds, Calol Multi-Service Oil has decreased the amount of oil used in air compressors as much as 20% in some cases. It is also highly efficient in the lubrication of natural gas engines, industrial Diesel engines, vacuum and pressure pumps and enclosed reduction gears and their integral parts.

Calol Multi-Service Oil spreads rapidly on bearing surfaces, adheres tightly and withstands high temperatures and pressures. It comes in six viscosity grades: 45X, 50X, 55X (SAE 20), 65X (SAE 30), 75X (SAE 40) and 85X (SAE 50).

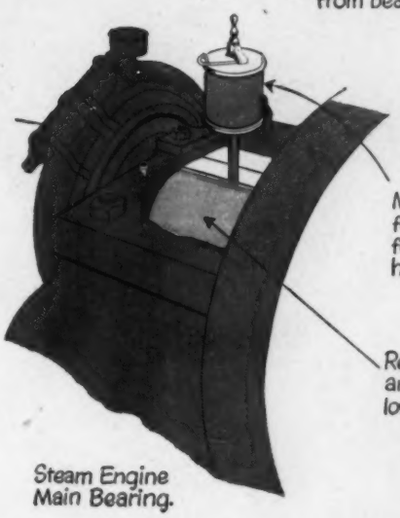
Where rapid separation from water is not required, Calol Multi-Service Oil may be applied satisfactorily by oil circulating systems. It is also applied by ring-, drop-, bottle-oilers and by hand oiling.


Calol Multi-Service Oil resists high temperatures and pressures on heavy-duty bearings.
Spreads rapidly over bearing surfaces and maintains uniform lubricant film.
Compounding prevents excessive oxidation and helps to remove varnish and lacquer.
May be applied by ring-, drop-, bottle-oilers and circulating systems.

Air Compressor Main Bearing.

This drawing prepared with cooperation of Chicago Pneumatic Tool Co.

Calol Red Engine Oil X is compounded to resist high pressure and displacement from bearing surfaces.


High affinity for metal cuts consumption and helps prevent rusting.
May be applied by drop-feed, ring, chain, wick-feed oilers or by hand oiling.
Reduces starting torque and friction in high-load, low-speed conditions.

Steam Engine Main Bearing.

New compounded Red Engine Oil cuts expense

To meet severe conditions encountered in the lubrication of external bearings of general industrial machinery, Calol Red Engine Oil X was recently developed and added to the Calol Red Engine Oil line. This new oil comes in three viscosity grades: 13X, 16X, and 26X.

Calol Red Engine Oil X is made from selected mineral oils to which are added special compounds. The high quality base oils and special additives give it outstanding ability to maintain a tough oil film on bearings in heavy-load high-temperature conditions. Compared to straight mineral oils, this cuts consumption, lowers starting torque and frictional resistance, gives more protection against rusting and promotes better circulation in ring-, and chain-oilers.

Calol Red Engine Oil X has a low pour test which allows easy application in a wide range of atmospheric temperatures.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

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To assure uniformly successful results, the finest in diamonds, materials and workmanship are blended into every J. K. Smit Standard Tool. And you can count on *exact* dimensions for every make of grinder. In ordering, state the grinder manufacturer's name and type of machine.

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Designed to dress abrasive wheels with speed in any variety of shapes required, J. K. Smit Form Dressing Tools are made with selected diamonds that permit close tolerances, high finish and long tool life. Blade and chisel tools, cone shaped, pyramid type and other dressers with formed radii and specific included angles are available.

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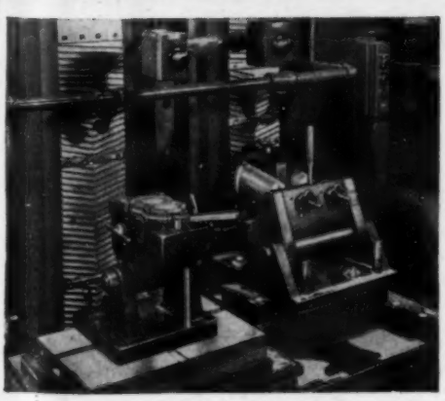
5105

THE JOHNSON SEA HORSE SHOWS HOW

ON OILGEAR SURFACE BROACHING MACHINES

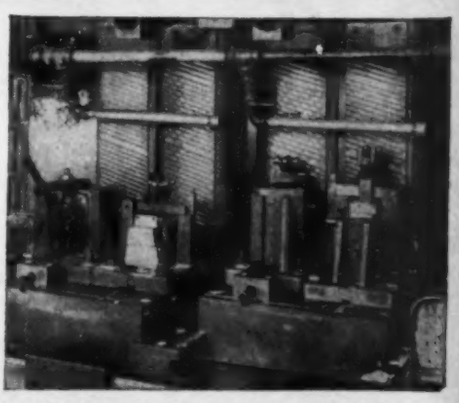
Operator loading twin cylinder head in fixture on Oilgear Double Slide Vertical Surface Broaching Machine. Fixture tilts forward to broaching position.

Oilgear Fluid Power



Twin cylinder head loaded on left hand fixture while two other parts in right hand fixture are being broached.

Fixtures and parts for water pump housing and twin cylinder head. Parts are also in loaded position.



Showing wide slab broaching tools that can be applied to Oilgear single and double slide Vertical Surface Broaching Machines.

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*Reg US Pat Off

NO BLOWER OR POWER NEEDED TO REACH HIGH TEMPERATURES WITH A "BUZZER" GAS FURNACE . . . JUST CONNECT TO YOUR GAS SUPPLY.

Rectangular Heat Baths

For liquid heat treating baths, soft metal melting, etc.

The High Speed Full Muffle Furnace quickly attains a temperature of 2400° F., and is designed for High Carbon and Alloy Steels.

"BUZZER" Rectangular Heat Baths meet the increasing demands liquid Heat Bath Furnaces and Metal Melting. Also made in round pot furnace type.

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ATTAINS 2400° F. QUICKLY

Full Muffle Furnace (Bench Type)

CHARLES A. HONES, INC.

121 South Grand Avenue Baldwin, L. I., N. Y.

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MECHANICAL MUSCLE

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May be worked at from four sides. Three table surfaces. Four point support. Fast lift and slow lift mechanism. Positive floor lock.

Standard model capacities, 1,000 to 5,000 pounds. Special models built on order. Write for Bulletin P-47.

THE *Hamilton* TOOL COMPANY

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ACCURACY BOOSTS PRODUCTION

No. 1G	INTERNAL GRINDER	No. 34	VERTICAL SPINDLE SURFACE GRINDER
No. 1½	HAND FEED SURFACE GRINDER	No. 3B	AUTOMATIC FEED SURFACE GRINDER

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★ CATALOG AND FULL SCALE TEMPLATES UPON REQUEST ★

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The Woodworth "CONE-LOK" jig utilizes the full braking power of its perfectly mated male and female cones.

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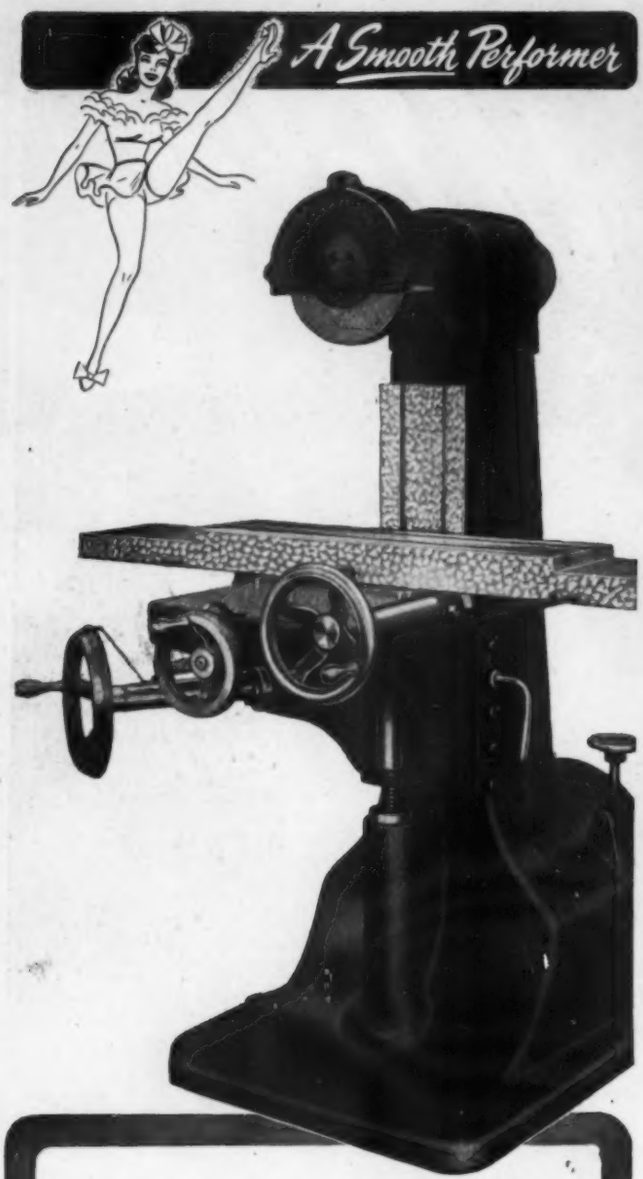
Detroit 11, Michigan

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON



NO. 11 LEACH
SURFACE GRINDER

For smooth performance . . . for flexibility . . . for fast, accurate production, the rugged No. 11 Leach Surface Grinder is unequalled — anywhere!

You can depend on Leach engineering!

EXTRA LARGE CAPACITY
6" x 24" x 12"
HEIGHT 52"
WEIGHT 850 lbs.
2 SPINDLE SPEEDS
2600 and 3500 R. P. M.

$750.00

Complete with motor of standard current characteristics F.O.B. Factory

For further information write Dept. A

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You, too, may have a water-soluble grinding problem.

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from the originators of grinding lubricants?

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Roastin' Ears too, demand it...

PROPER WORKING EQUIPMENT

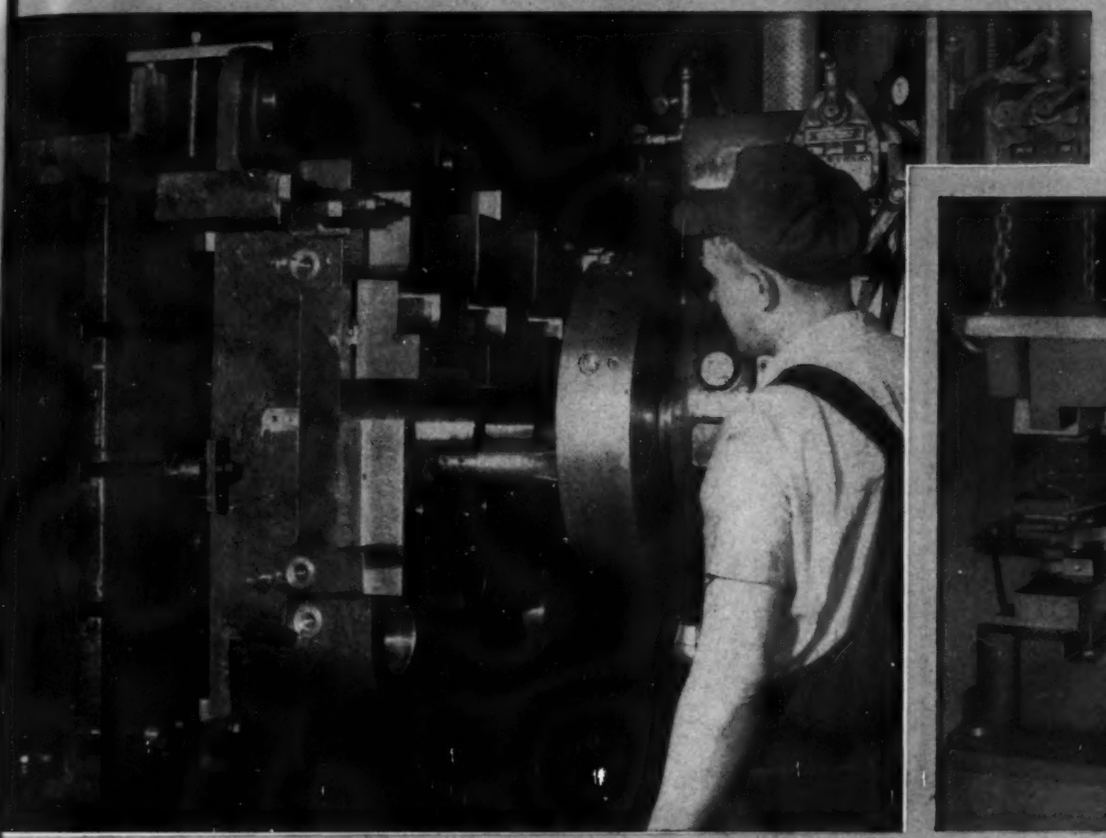
WHILE only nature can help the little miss, Thriftmaster Multiple Spindle Drillheads are designed to accelerate your production.

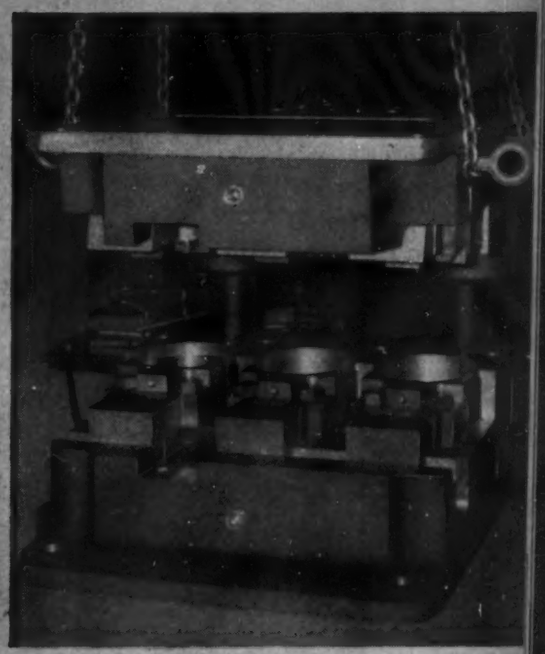
Standard adjustable heads are made with 2, 3 or 4 spindles. Three- and four-spindle types, as illustrated, drill in a circular pattern. Three-spindle heads are also furnished for drilling equidistant on a straight line.

In all Thriftmaster Drillheads, power is transmitted from a fixed-center drive directly to the drill spindles by means of heavy, immersion-lubricated gears. All gears and rotating parts are of alloy-hardened, heat-treated steel for proper strength and wear characteristics and are ball bearing mounted to insure long life at maximum operating capacity. For information or recommendations write to: ENGINEERING DEPARTMENT, THRIFTMASTER PRODUCTS CORP., 1048 N. PLUM ST., LANCASTER, PA.

THRIFTMASTER
Multiple Spindle Drillheads

Now Danly Special Die Sets





with any additional machining required

New equipment installed in the Danly shop permits us to do any machine work on large or complex die sets incidental to the mounting of the dies. Inserts, recesses, additional boring, keyways and other machining can be done to the customer's specifications.

Time is saved by this service as work on dies and on the die set can be done at the same time. It permits the die shop or tool room to devote their equipment and man hours to the making of dies. The problem of the handling of big sets, for which the die shop or tool room are not generally equipped to do economically, is also solved by this service.

These special die sets are then delivered ready for the mounting of the dies. Note the size and complexity of the die set shown on this page. This die set—machined at Danly—is an example of the additional machining and service which this company offers.

On your next special die set inquiry include the additional machining work that you wish done at Danly while the die set is being made. The cost of this machining will be shown as a separate item in the quotation.

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DANLY *Special* DIE SETS

MACHINED TO YOUR SPECIFICATIONS

MAKE SOLDER BONDS
Right-Tight-Precise

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KESTER Cored SOLDERS

- Kester Cored Solders are correctly compounded to provide permanent performance and maximum precision. They're made to withstand wear and tear, and they fit your soldering operation like a hand-tailored glove.
- What's more, Kester Cored Solders cut the hard work out of soldering. They're applied quickly and easily—in one, simple operation. Self-contained fluxes are released as the solder is applied. The resulting solder bonds are tough, tight and dependable.
- Kester Cored Solders are of the highest quality and unvarying uniformity—the result of Kester's nearly half a century of practical experience and exhaustive research.
- Kester Rosin-Core Solder, for electrical connections, and Kester Acid-Core Solder, for general work, are both available in a wide range of strand and core sizes. The correct solder, always, for any soldering job.
- Consult Kester Engineers without obligation for aid in the solution of any soldering operation. There is no obligation!

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Cored Solders
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FOR MATERIALS HANDLING--

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ELECTRIC HOIST

Your greatest problem today is to make deliveries faster at lower cost. That is exactly why Ford designed the new *WHIPPET* Electric Hoist. The *WHIPPET* is a cost reducer in production and in maintenance. There is no finer electric hoist in its price range on the market today. From 250 to 2000 pounds capacity. Send for your copy of folder DH-1325.

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AMERICAN CHAIN & CABLE

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Drilling with a 1" wood auger. Notice large chips. Action photo taken at f32 and 1/5000 sec. electro-flash.

NO KICK - NO TWIST EVEN ON THE TOUGHEST JOB

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- Applies and removes nuts
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The patented "rotary impact" mechanism that gives this outstanding performance also assures trouble-free service by permitting the motor to run even if the spindle is completely stalled!

AMAZING! It's reversible . . . full power in either direction . . . runs on 110 V ac-dc.

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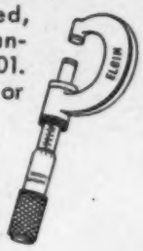
Precision engineered, light weight, guaranteed accuracy of .0001. Available in English or Metric. Tips remain flat even in grinding room usage. Outwearing steel in the plant of a drill manufacturer as much as 7000 times.



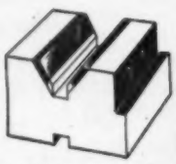
REFER D-10—SAPPHIRE SHORTS

WINDING GUIDES

Sapphire guides abrasive or coated wire, filaments or thread with minimum of wear to the guide and no abrading of wire surface. Variety of shapes. Hole sizes from .003 up. Outwears carbides consistently on every job.

REFER D-9—SAPPHIRE SHORTS

VEE BLOCK



Sapphire faced Vee blocks, gage anvils and wear surfaces provide a true non-wearing, non-magnetic contact area; non-corrosive. Design into your equipment to solve wear problems.

REFER D-13—SAPPHIRE SHORTS

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PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
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PUMPS

that

"NEVER LET YOU DOWN"

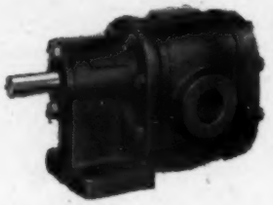
. . . for

- ★ *circulating liquids*
- ★ *transferring liquids*
- ★ *supplying lubricant*
- ★ *supplying coolant*
- ★ *hydraulic installations*

The simple, sturdy construction and dependable, trouble-free operation of Brown & Sharpe Pumps are widely recognized throughout industry.
Brown & Sharpe Rotary Geared Pumps are made in several stock styles and sizes . . . capacities from ½ gallon per minute at 0 lbs. pressure to 37.6 gallons per minute at 0 lbs. pressure . . . for pressures up to 500 psi. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

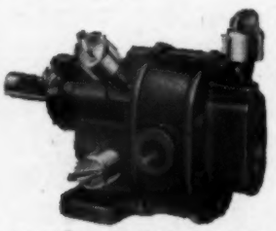
We urge buying through the Distributor

Nos. 15, 25 and 35 Rotary Geared Pumps with helical gears — for coolant, general circulation and low pressure hydraulic service. Renewable bearings. Mechanical Seals. With or without relief valves.



Nos. 53 and 55 Rotary Geared Pumps with roller bearings and helical gears; for hydraulic installations. Supply oil under pressure. Although designed for direct drive, can be pulley or gear driven.

The 500 Series Rotary Geared Pumps — for hydraulic installations. Quiet at high speeds and under pressures to 500 psi. Moving parts balanced hydraulically for end thrust.



Nos. 21 and 23 Bronze Rotary Geared Pumps . . . suitable for providing circulation on water-jacketed engines and for pumping saline solutions.

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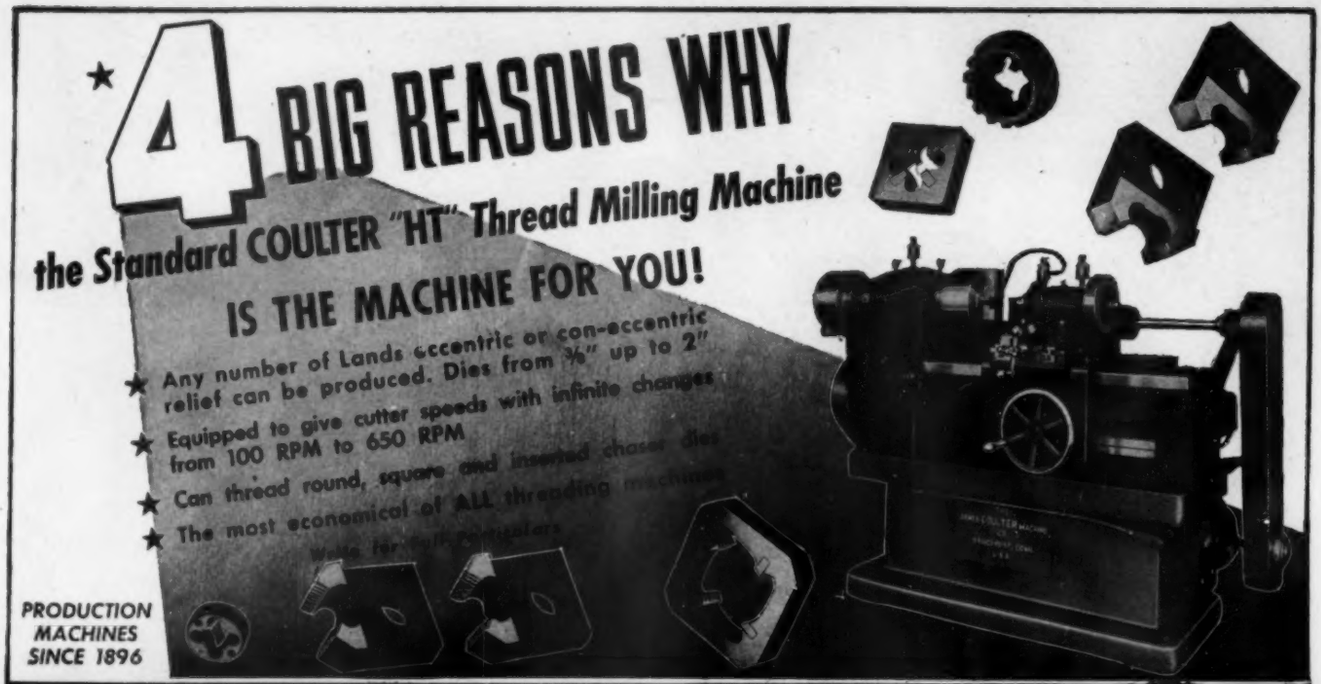

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PREVENT DANGEROUS Work Seizure!

For SAFETY—Use Only

CMD Anti-Scoring CENTER POINT OIL

To avoid personal injury, ruined work, and costly delays, lubricate centers, steady rests, cams and other machine parts with CMD Center Point Oil. It withstands pressure greater than 50,000 lbs. per square inch. Try it free! See for yourself!

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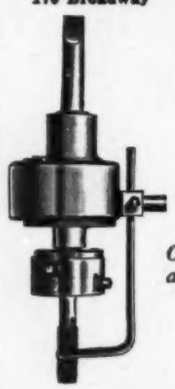
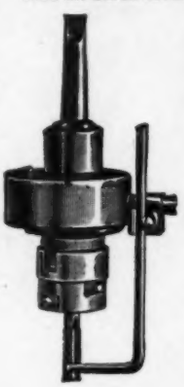
" 0	1/16" ⅛"
" 1	1/16" ¾"
" 2	3/16" 1 "
" 3	5/16" 1¼"
" 4	¾" 1½"
" 5	¾" 2 "



Our High Speed Tappers are Super-Sensitive for Small Tapping



Style B Positive Stop Holds Work Down

Style C Graduated Adjustable Safety Friction

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Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustment in each tapholder. If required. Also, Opening Die-Heads; Opening Stud-Setters; Friction Screw-Drivers and Nut-Setters, etc.

IN THOUSANDS OF PLANTS WHERE PRODUCTION COSTS ARE OF VITAL IMPORTANCE

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HANSEN
COUPLINGS GET RESULTS

When you use Hansen couplings, connections and change-overs become a matter of seconds—with no hold-up of costly operations. ♦ ♦ ♦ To connect a Hansen coupling on air, oil, or grease lines, you merely push plug into socket—flow is immediate and completely automatic. To disconnect, slide sleeve back with thumb, plug pops out and supply line is effectively sealed with no leaks or losses. ♦ ♦ ♦ It's the minutes saved on operations repeated over and over that add up to substantial savings. There's a Hansen coupling for every purpose or pressure requirement—for air, oil, or grease—for oxygen—for acetylene—also the new Hansen two-way shut-off coupling which completely seals both ends of line when disconnected.

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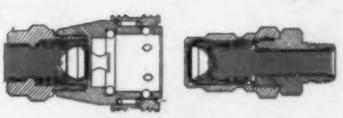
The Hansen Two-Way, Shut-Off Coupling.



Red section shows how rubber washer in valve stem contacts valve seat in both plug and socket, sealing both plug and socket against leakage instantly.

Red section shows flow of liquid or gas around spool section of valve, permitting free flow of liquid or gas through coupling instantly upon connection.

THE HANSEN MANUFACTURING CO.

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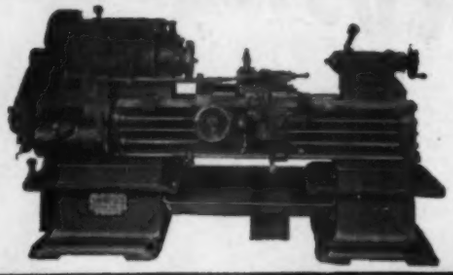

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Springfield designs lathes to retain accuracy and speed over long periods of use. For quantity production or special use they're economical and extremely adaptable. Sizes available range from 14" to 30". *Write for descriptive bulletins, prices and deliveries.*

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the tool that converts drilling machines into key-seaters and saves time and money

• With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

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Made in twenty-seven different diameters from ½" to 3½". Several widths of cutters can be used in each size.

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. . . parts weighing hundreds of pounds?
. . . sheets only .001" thick?
. . . internal surfaces of cylinders?
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. . . gear teeth on the pitch line?

THESE are simple, every-day jobs for Wilson hardness testing equipment. Any of our representatives can give you the answer to these and many other such questions.

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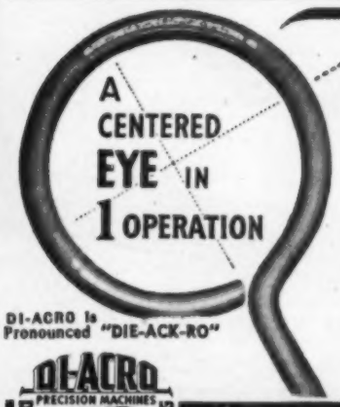

DI-ACRO Is Pronounced "DIE-ACK-RO"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

Precision CENTERED EYE Bending

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at high hourly production rates. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

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Forming radius approx. 2". Capacity 3/16" round cold rolled steel bar or equivalent. Also Benders No. 2 and 3, with larger capacities.

With DI-ACRO Benders

DI-ACRO Precision Bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

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"DIE-LESS" DUPLICATING showing many kinds of "Die-less" duplicating produced with DI-ACRO Benders, Brakes, Shears, Notchers, Rod Parters, Punches.

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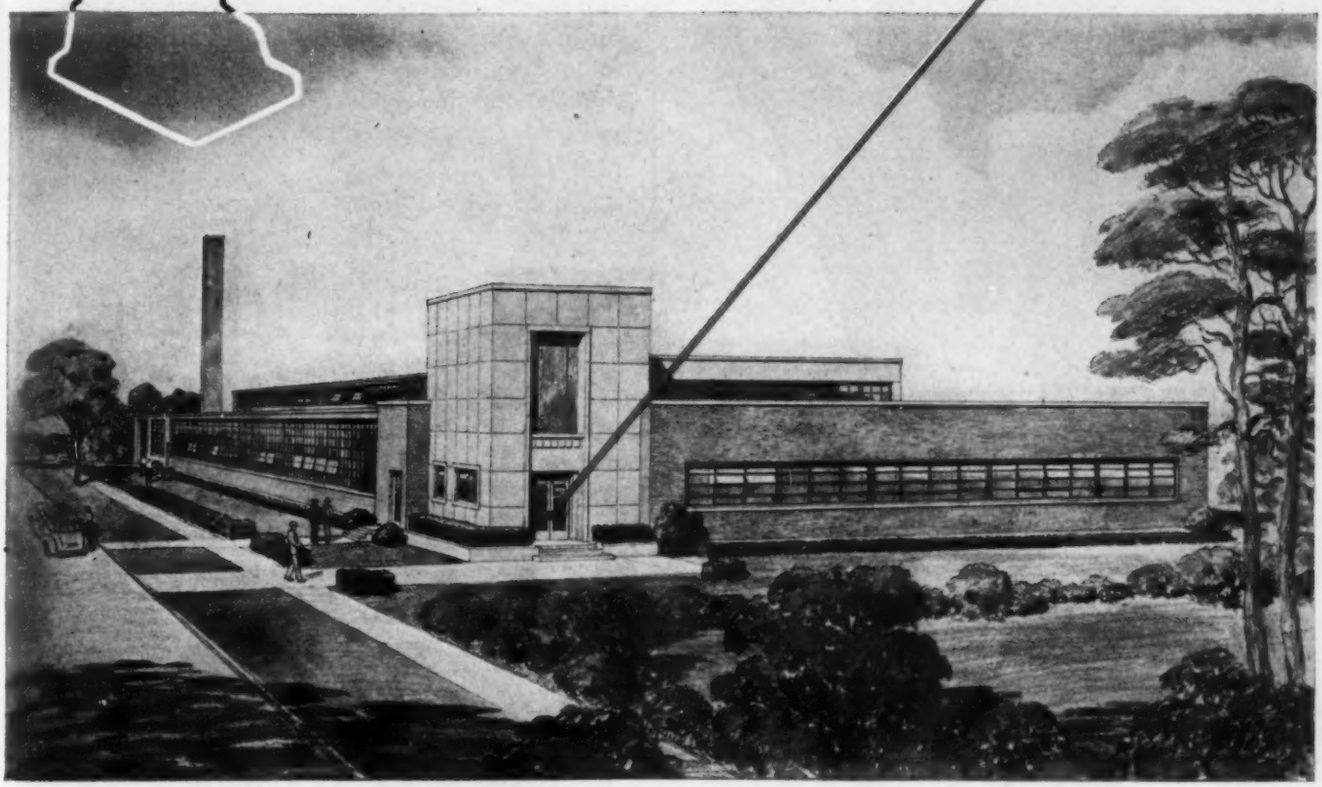

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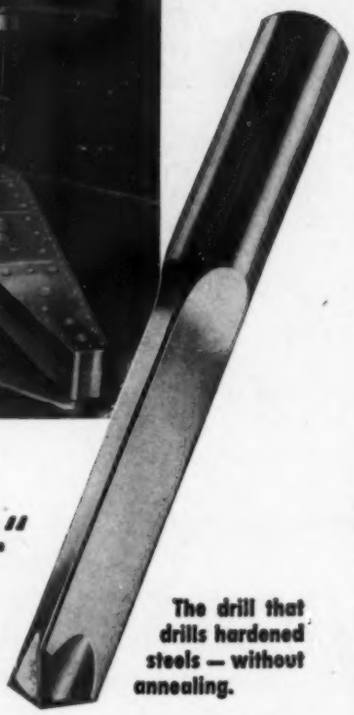

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The drill that drills hardened steels — without annealing.

When last minute changes come through on hardened parts and dies—drill without annealing using "HARDSTEEL" drills—and save time.

When parts must positively match at assembly—harden first, then drill with "HARDSTEEL" drills—and save time.

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Yes, "HARDSTEEL" drills, made of special material and to a special design eliminate all annealing and the distortion usually caused by rehardening. They work on steels hardened by any process to 40 Rockwell "C" or harder.

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"HARDSTEEL" Tool bits make faster, deeper cuts on steels and non-ferrous alloys.

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1390 East 222nd Street CLEVELAND 17, OHIO

"HARDSTEEL"
DRILLS • TOOL BITS • SPECIALS

TWO HEADS ARE BETTER THAN ONE

The combination of your ideas and our ideas mean quality and cost reductions—through finer tools, dies, jigs, etc. Our engineers and tool designers are ready to interpret your plans and carry them through to a practical and successful conclusion.

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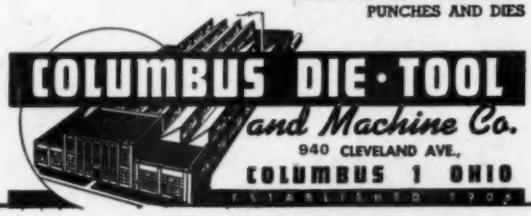
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



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ESTABLISHED 1904

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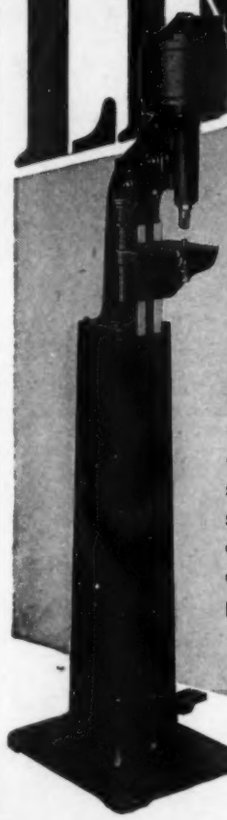
for NOISELESS, HIGH SPEED RIVETING



Rotary spinning principle shapes uniform heads, silently . . . capacities up to ⅜ inch diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

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EXCLUSIVE with LAPOINTE!

Electrolized BROACHES

After considerable engineering research on actual broaching operations, The Lapointe Machine Tool Co. is proud to announce its exclusive distribution of Electrolized Broaches. Here are some enthusiastic reports illustrating the outstanding features of the Electrolizing Process:

1. **Greater Production** — because of increased wear-resistance. A gear manufacturer, averaging 50 to 75 pieces between sharpenings, produced over 700 pieces after Electrolizing the broach with no signs of resharpening necessary.

2. **Better Quality** — because of less surface friction. Another manufacturer encountering excessive heat in the broaching of brass switched to the Electrolizing Process. The added smoothness solved his problem.

3. **Less "Down Time"** — because of fewer sharpenings. A manufacturer of .22 caliber rifles could broach only 75 barrels, twenty-three inches in length, between sharpenings. After electrolizing, more than 372 barrels were broached before resharpening.

By running comparative tests on your own machines, under your own operating conditions, see for yourself how Electrolized Broaches can boost your production.

HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

Write today to the Lapointe Machine Tool Company for information on the exclusive Electrolized Broaches. Mention Dept. No. 37.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

the right line for the right blade

THE Star line *is* the right line because it's *really complete.* At your Star supplier you'll find a blade for every job a hack saw or band saw can do. In addition, you'll get the *right* blade because your Star supplier is backed by *a complete line* of blades that have *proved faster, longer wearing,* in cutting metals, plastics, and other non-metallics. So, add it up any way you like, Star blades, frames and band saws, amount to *more* economy, *more* convenience, and *more* satisfaction. Yes, you can't go wrong when you see your Star supplier—he has the right line, the right saw *for you.* It's Star.

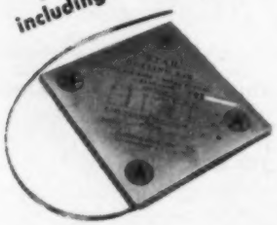
This booklet is packed with facts on saw selection, use, care — prices, too. Get your copy from your Star supplier . . . it's free.

• HAND BLADES

• POWER BLADES

• FRAMES

• BAND SAWS (Metal Cutting, including Skip-tooth)



Sold only through recognized distributors

CLEMSON

CLEMSON BROS., Inc., Middletown, N. Y.

Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson E-17 lawn machine

2104

1897 1947

TEMPUS FUGIT... We wanted an arresting illustration for this advertisement, but we could not conceive a satisfactory method of portraying the idea of succeeding generations of industrious, God-fearing, peace-loving, free American workmen, applying their skills day after day, year after year, to make small and large ball bearings of steadily improving quality and accuracy.

Good copy is short, the experts tell us—then how could we talk about the wars, shortages, boom-times, depressions, stoppages during these fifty years, that sometimes hindered but never arrested the forward progress of a fine product.

Or the challenge of invention—new automotive vehicles, industrial machinery, marine, farm and aviation equipment, to tax the ingenuity of our designers and engineers.

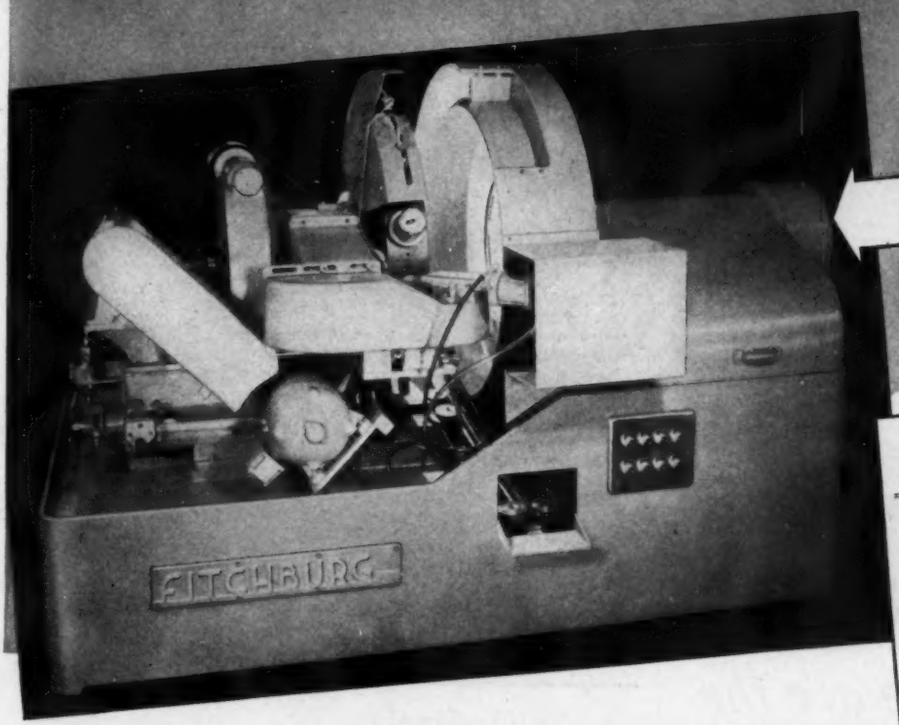
Or the loyal friends we serve in these various industries who have learned to know us and who hold BCA Ball Bearings in high regard.

So we pause to mark the passage of time, survey our accomplishments, and salute our patrons with a promise to continue to work for and with them in designing and planning for the future.

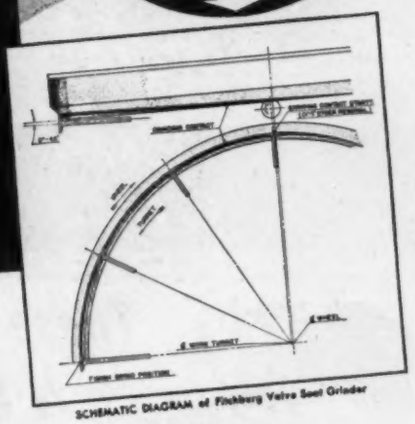
BEARINGS COMPANY OF AMERICA
LANCASTER, PA.

BCA RADIAL · ANGULAR CONTACT · THRUST **BALL BEARINGS**

PRODUCTION IS 4 TO 10 TIMES GREATER on a FITCHBURG



CONSTA CONTAC GRINDER



SCHEMATIC DIAGRAM of Fitchburg Valve Seat Grinder

A BASICALLY NEW, MORE PROFITABLE METHOD FOR MASS-PRODUCTION CYLINDRICAL GRINDING

THE SIMPLE PRINCIPLE: Work pieces are automatically fed into 12 quill-type spindles on the periphery of a rotating turret. For one-quarter revolution of the turret, each rotating piece bears against the rotating wheel face. The pieces are automatically released on the downward arc and conveyed out of the machine. THE GRINDING PROCESS IS CONTINUOUS and the relative position of the turret and the wheel gives AUTOMATIC SELF-ADJUSTING FEED and AUTOMATIC SIZE CONTROL.

THE COST-CUTTING PRODUCTIVE RESULT: The FITCHBURG CONSTA-CONTAC Valve Seat Grinder shown above will grind the seats of automotive valves—from the rough forging to the finished size—without any necessity to deburr—*at the rate of 2160 per hour*—a rate vastly greater than possible by any other present method.

The inherent speed and economy of CONSTA-CONTAC GRINDING is best utilized in comparatively large-scale production. Present capacity is any part that can be chucked that is not greater than 3" dia. x 7" long.

Your inquiry for further information about CONSTA-CONTAC GRINDING—and a possible application of this new profitable grinding principle to your products—is invited.

Features:

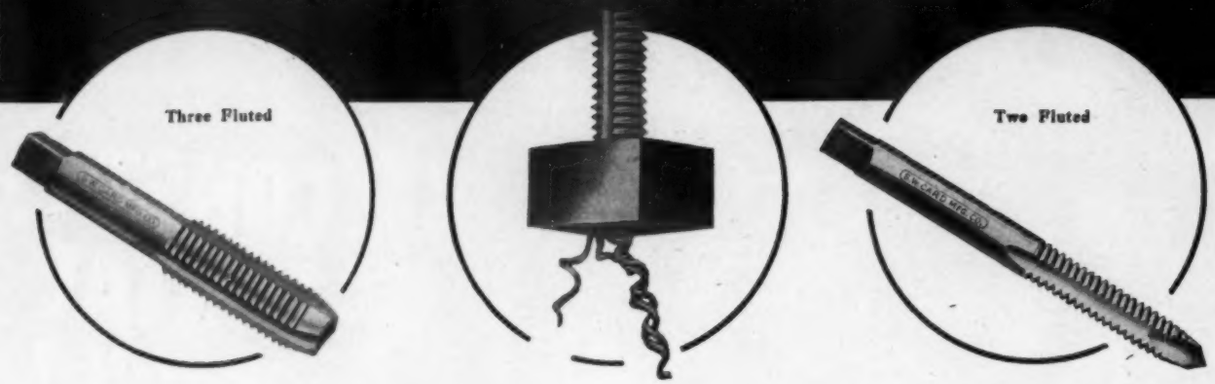
- ★ No "grinding air" time loss—3 or more parts are always "sparking" (the greater the stock removal, the more parts are "sparking".)
- ★ Automatic Size Control.
- ★ Actual sparking time is the same as that of other present methods—*but* CONSTA-CONTAC grinds 3 or more pieces in the sparking time required by one piece.
- ★ Work can be chucked or held on short centers.
- ★ Wheel can have both coarse and fine cutting surfaces—to rough- and finish-grind in one pass.
- ★ Wheel can be formed to grind several diameters and shoulders—exactly as in present-day formed-wheel grinding.

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Ba-gage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders.

CARD SPIRAL POINTED TAPS

for free, accurate thread cutting in deep holes



Designed for tapping deep through holes or blind holes drilled deeply enough for chip clearance at bottom of hole. Cutting is done by the first few threads milled at an angle. Chips are forced ahead of tap, preventing chips clogging in flutes, thereby increasing strength of tap and minimizing chances of breakage.

CARD SPIRAL POINTED TAPS assure free cutting, and fine quality threads. Furnished in carbon steel and high speed steel types. Fully described in Card Catalog, available promptly on request.

CARD TAPS ARE SOLD BY LEADING DEALERS EVERYWHERE

S. W. CARD MANUFACTURING CO.

Mansfield, Mass., U. S. A.
DIVISION OF UNION TWIST DRILL CO.

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These are the NEW

DUBLIFE Plug Gages with

COLORED *Plastic* (INSULATING) COLLETS

GREEN for "GO"

RED for "NO GO"

Colored Collets identify plug instantly. Weight is reduced. Plugs securely locked without marring or scratching plugs as with metal collets.

New Light Weight Handle with these collets.

DUBLIFE

In one and same balanced handle, 2 "GO" and 2 "NO GO" Plugs. Tolerances to .00002. Reverse either plug when wear shows and you have a new, fresh gage. Time saving! Gage saving! Money saving! It is to your advantage to know about DUBLIFE GAGES with colored plastic collets and light weight handles. Send for complete catalog showing DUBLIFE and A. G. Design Gages.

Ask for Catalog "G"

UNITED PRECISION PRODUCTS CO.

SHABBONA, ILLINOIS

Alloy Steel Service From Seven Warehouses!

AISI **HY-TEN** **SAE**

ALLOY STEELS

Cutting to length, Heat treating, Forging. Testing, Turning, Special Finishes. Prompt shipment of rounds, squares, flats, hexagons, octagons, and billets. Technical information and recommendations.

Write for our data sheet book.

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(Est. 1846)

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CLEVELAND 14 — CHICAGO 23 — HILLSIDE, N. J.
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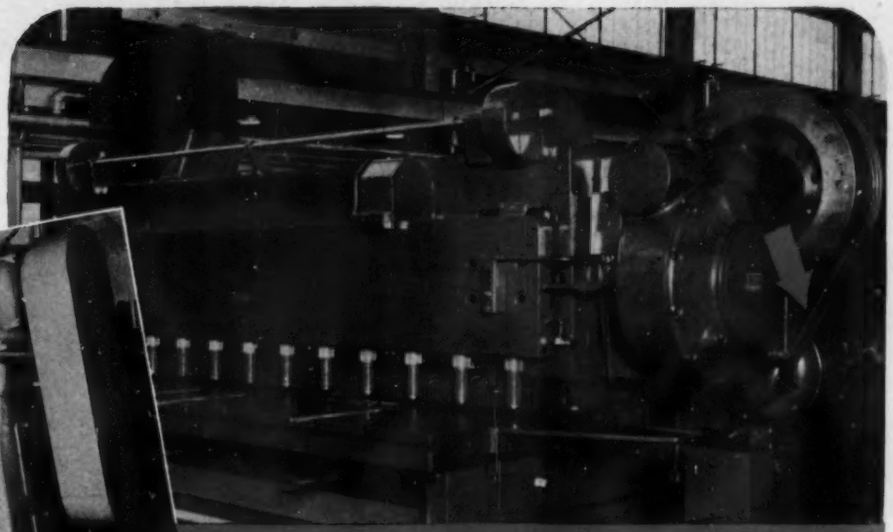
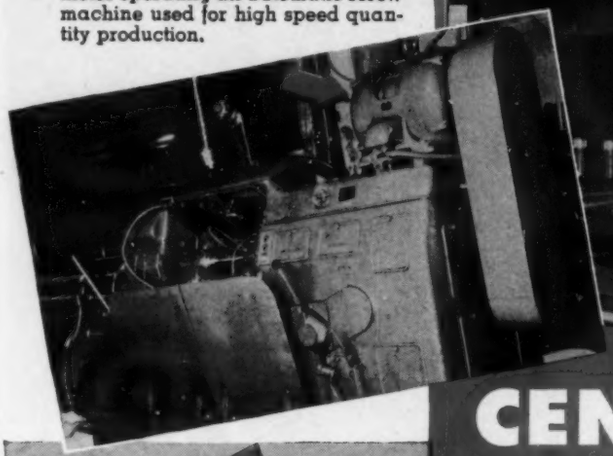
At right — Century 30 Horse Power high torque, high slip motor operating a heavy duty shear. High slip motor reduces the shock loads when shearing heavy plate.

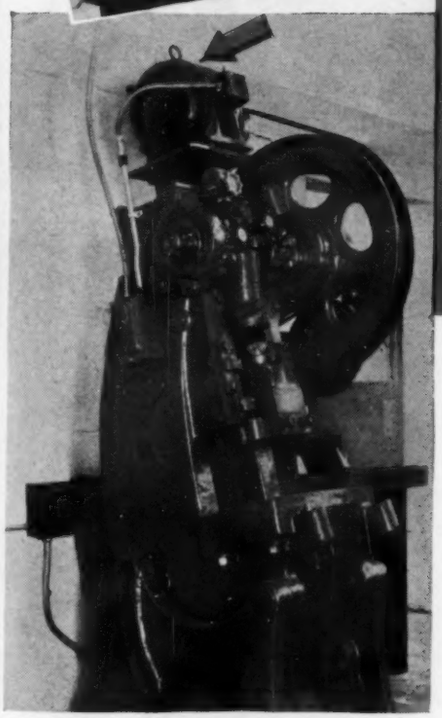
Below — Century 20 Horse Power motor operating an automatic screw machine used for high speed quantity production.





CENTURY MOTORS

Assist in maintaining close tolerance in production...



Century 2 Horse Power, open-rated general purpose motor operating a punch press making small parts.

Thousands of Century motors on machine tools in modern feeder departments are helping to maintain production schedules and keep assembly lines running. The unusual freedom from vibration of these motors assists in maintaining close tolerance in production.

Century machine tool motors are built to stand up under the toughest operating conditions. Their rugged frames, accurately machined feet, large shafts, accurate alignments, good mechanical and electrical balance — all contribute to their outstanding performance.

Century builds a complete line of electric motors and generators, fractional and integral horse power, in the popular sizes to meet the requirements of industrial production, processing, and appliance needs.

Specify Century motors on all electrically powered equipment.

Century C MOTORS

CENTURY ELECTRIC CO.

1806 Pine St. St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

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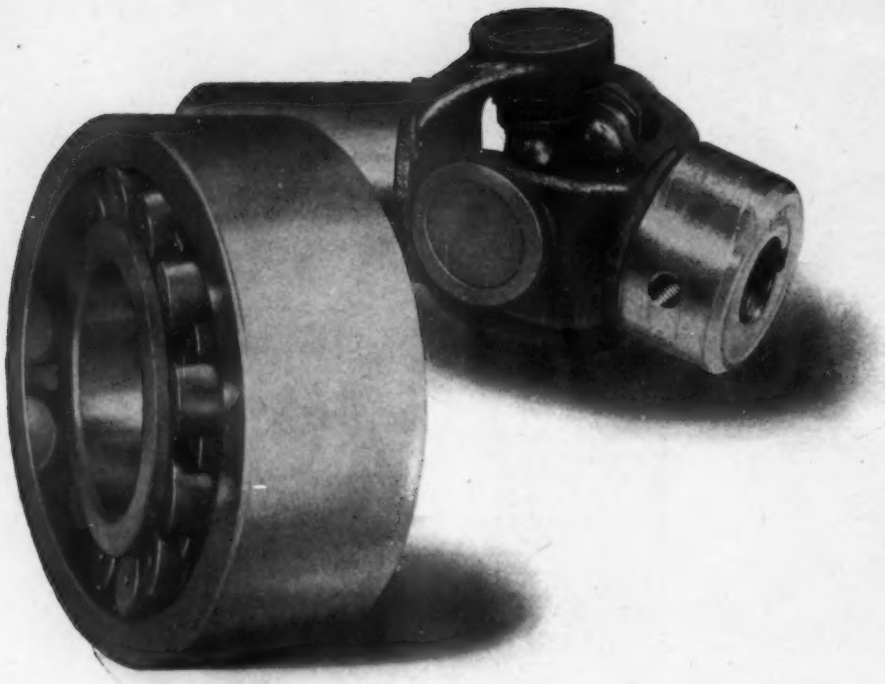

Misalignment accommodated smoothly...

as a universal joint allows out-of-line shafts to rotate freely, similarly the Spherical Roller Bearing accommodates misalignment and shaft deflection. Rapid wear, binding and unusual stresses can be eliminated

By this "universal" self-aligning bearing...

which operates at full radial and thrust capacity under conditions of misalignment which cause premature failure of other types of bearings.

This feature of the Torrington Spherical Roller Bearing is coupled with the advantages of high radial capacity, two-directional thrust capacity and unit design for easy handling. Write for further information contained in our Technical Bulletin #200-A.

THE TORRINGTON COMPANY

SOUTH BEND 21, INDIANA — TORRINGTON, CONN.

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• NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL •

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FREE CUTTING BRASS ROD

FOR QUICK, ECONOMICAL MACHINING

1—Special flange fitting
2—Flexible tube adapter
3—½" high-pressure fitting
4—Tapered hose connection
5—Flared-type fitting
6—Bushing for pressure tube fitting
7—Inverted S.A.E. swivel union
8—Automotive brake cylinder
9—Faucet handle
10—Flared-type fitting
11—Hot water cut-off valve
12—Oil tank cap part
13—½" I.P.S. male fitting
14—Valve stem regulator
15—Welding hose connection
16—Automotive air brake part
17—Water valve stem pack nut
18 & 19—Lamp top ornaments
20—Carbureter valve
21—Welding hose connection
22—Oil feeder valve
23—Valve stem
24—Pack nut
25—Inverted S.A.E. swivel union
26—Male swivel detachable union
27—Flared-type fitting
28—Detachable ring-type hose fitting
29—Compression fitting assembly
30—Oil feeder adjusting valve
31—7/16" female compression union
32—Fuse part
33—S.A.E. long nut
34—Orifice spud
35—Worm gear
36—Threaded sleeve-type union
37—Toilet tank spud
38—Acorn nuts for finish trim
39—Hex nuts

REVERE FREE CUTTING BRASS ROD

A Versatile Metal. Though in many cases it is machining quality that is the primary reason for the specification of Revere Free Cutting Brass, this versatile metal has other important qualities that are worth remembering. It is strong, having a tensile strength of 49,000 pounds or more per square inch. Hence it can take relatively heavy loads. Threads and collars can be depended upon to stand up under stress. Another important factor is its favorable coefficient of friction with cast iron and steel in bearings. This brass is also highly resistant to corrosion, being unaffected by, and free from contaminating effects upon, a wide variety of gases and liquids, resulting in its use in valves, fittings, unions, nozzles and similar parts.

Lead Content. Revere Free Cutting Brass Rod contains about 3% lead. This is not dissolved but is thoroughly distributed throughout the metal in the form of finely-divided particles. The lead reduces friction by causing the chips to break off short, so that they are in only momentary contact with the cutting edge of the tool. This lessens the amount of heat generated. Life of the tool is correspondingly extended, and long runs without regrinding are usual.

Machining Speeds. Surface speeds as high as 700 feet per minute are possible. Rough cuts as deep as 0.020" can be taken. Such speeds and cuts materially reduce production time over other materials having less outstanding machining characteristics.

Finish. With proper tooling, parts made of Revere Free Cutting Brass Rod come from the machine with a brilliant, smooth, highly-polished appearance, due to the practically flawless surface. Any tolerance within the capability of the machine and operator may be easily obtained. Threads are sharp and clean down to their roots.

No Burrs. This metal may be cut- and roll-threaded, drilled and tapped, milled, broached, and sawed with no appreciable burrs.

Temper. In the majority of cases, Revere Free Cutting Brass Rod is supplied hard drawn. This hardness facilitates chip breakage, while the high strength resulting from drawing assures strong threads. However, if desired for special purposes, Revere can supply soft Free Cutting Brass Rod.

High Standards. Revere Free Cutting Brass Rod is drawn to close tolerances on dimensions and straightness, and is stress-relieved after drawing. The metallurgical and physical characteristics of the metal are under constant laboratory check. It is therefore especially suitable for automatic screw machines, which require stock having high uniformity in quality and dimensions.

Additional Advantages. The smooth surfaces produced by machining Revere Free Cutting Brass Rod are ideal for plating. The metal is easily soldered, can be welded if desired, and it is of course non-rusting and corrosion-resistant. Even at a slightly higher cost over other materials, this brass often is more economical for screw machine production, due to the speed with which the various operations may be conducted, and the value of the scrap.

Consult Revere. Because no single metal or alloy is suitable for all requirements, Revere offers many, each having some outstanding virtues and advantages. Selection of the most advantageous Revere Metal for a given process, part, or product may make a big improvement in such important items as cost of manufacture, durability, and even saleability. The Revere Technical Advisory Service will gladly cooperate with you in studying your requirements.

TYPICAL PROPERTIES

REVERE FREE CUTTING BRASS ROD

Alloy No. 240

COMPOSITION

Copper	61.5%
Zinc	35.5
Lead	3.0

TENSILE STRENGTH

Hard* 58,000 pounds per square inch

Soft† 49,000

ELONGATION

% in 2 inches

Hard*	25
Soft†	53

DENSITY

0.307 lbs. per cubic inch

Coefficient of Expansion

.0000114 per °F @ 68°F

ELECTRICAL CONDUCTIVITY

26 (%I.A.C.S. @ 68°F)

THERMAL CONDUCTIVITY

67 Btu. per sq. ft. per ft. per hr. per °F @ 68°F

*Hard, Rockwell B78 (app.)

†Soft, Rockwell F68 (app.)

Revere also supplies other types of Free Cutting Brass with desirable qualities for special operations, such as riveting or upsetting, spinning, highly accurate deep drilling.

Revere Metals include: *Copper and Copper Alloys:* Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings; *Aluminum Alloys:* Tube, Extruded Shapes, Forgings; *Magnesium Alloys:* Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings; *Steel:* Electric Welded Steel Tube.

REVERE

COPPER AND BRASS INCORPORATED

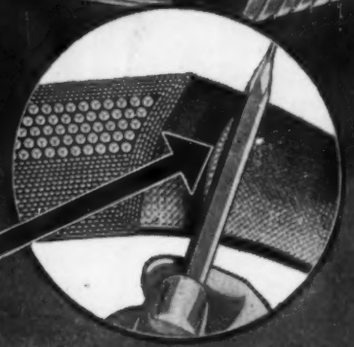
Founded by Paul Revere in 1801

230 Park Ave., New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. — Sales Offices in Principal Cities. Distributors Everywhere.

It's the SIDES OF A V-BELT That Really GET the WEAR!

—— ONLY the SIDES Touch the pulley!



The *SIDES Do ALL the GRIPPING*

—They Pick Up ALL the LOAD!

The moment you think about it, you realize, of course, that the *sidewall* is the part of a V-Belt that really gets the wear.

It's the *sidewall* that has to grip the pulley. It has to *pick up* all the power from the driver pulley, transmit that power to the belt as a whole and then, once more, deliver the power to the driven pulley. And the sidewall takes all the wear against the sheave-groove wall.

That is the perfectly natural reason why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that *wears out first!*

Now See How the Patented CONCAVE SIDE SAVES Sidewall Wear—Lengthens Belt Life.

Since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the middle of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

The CONCAVE SIDE is a GATES PATENT

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall —and that means much longer life for the belt.

4712

—and the Concave Side is *MORE IMPORTANT NOW* Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super Vulco Ropes capable of carrying much heavier loads —up to 40% *higher horsepower ratings* in some cases— the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

THE GATES RUBBER COMPANY DENVER, U. S. A., *"World's Largest Makers of V-Belts"*

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

THE MARK OF SPECIALIZED RESEARCH

Here's your stepping-stone to a

BETTER-PAYING MACHINIST'S JOB

There's a sound and sure path to more dollars. As hundreds of men have proved, you can boost your dollar-earning power with a little well-planned effort to know more. It's not hard—just plain facts will do it. Book facts!—On-the-job information that you can apply at the plant as soon as you've learned it. Give yourself that dollar-making push. Get the accumulated know-how of the experts, gathered together in the

AMERICAN MACHINISTS' LIBRARY

6 volumes, 2516 pages, 2368 illustrations, many charts and tables

THESE books answer your questions on methods and machines—tell what you need to know about the operation of machines of all types and sizes for the whole range of metal cutting, forming, and finishing operations—show by text, diagram, and illustration the essential points of setting up work, adjusting machines, selecting feeds and speeds, determining pressures, handling materials, devising short-cuts, etc.

Puts the mastery of machine-shop work at your fingertips

With these books at hand for quick reference, no job is too hard or unusual, and the routine jobs may be improved, with savings in time and trouble and reduced wastage.

What the Library gives you

—complete guide for everybody, from shop executive to apprentices, interested in the operation of machines used in turning and boring practice
—description of all important varieties of machine, both manual and automatic, and methods of operating them
—data on speeds and feeds, new cutting alloys and materials, use of coolants, etc.
—practical information on grinding machines and abrasive wheels, showing what they do, how to operate them, and how to make best use of them on various types of work
—training in the various operations performed in drilling and surfacing materials in the machine shop
—exact, descriptive data on all aspects of gear-cutting practice, useful in shops of any size
—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planing, shaping, slotting, milling and broaching.

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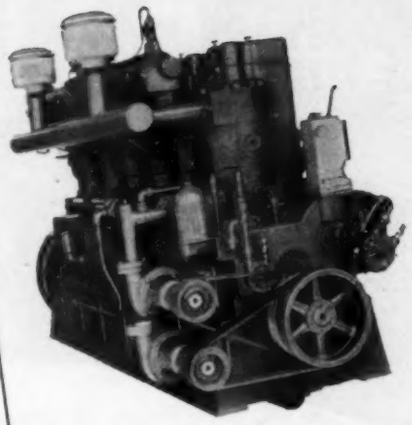
TUTHILL "Stripped" PUMPS For Your Machinery



Save space, reduce costs and improve appearance with Tuthill Stripped Pumps built directly into the design of your machinery. Ideal for lubrication, coolant, hydraulic and liquid transfer service. Two types available: Type S, without mounting bracket; and Type SA, pumping elements only. Capacities up to 200 g.p.m. Write for Tuthill Stripped Pump bulletin.

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Famous for

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- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on Page 209 Nov. 6, '47 American Machinist

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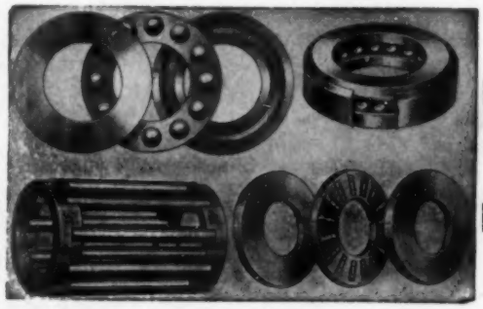
Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.



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Place your order for B & R B Precision Bearings. Deliveries and Service Dependable.

THE BALL & ROLLER BEARING CO., Danbury, Conn.

Your touch confirms

what your eye detects —

NUCUT
CUTTING POWER!

TRY IT YOURSELF. Run your thumb lightly along the surface of a Heller NUCUT File. Now you *feel* what you've already *seen*—a pattern of sharp "wavy teeth" . . . concentrated cutting power!

Deep-cutting coarse teeth . . . smooth-finishing fine teeth . . . *both* are teamed up in a Heller NUCUT. *One* file does the work of two.

You'll know this quick-clearing, fast-working, longer-lasting file by its White Tang. Write us for NUCUT shapes, cuts and sizes that best meet your requirements.

Look for the File with the WHITE TANG

HELLER
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"WAVY-TEETH" FILES

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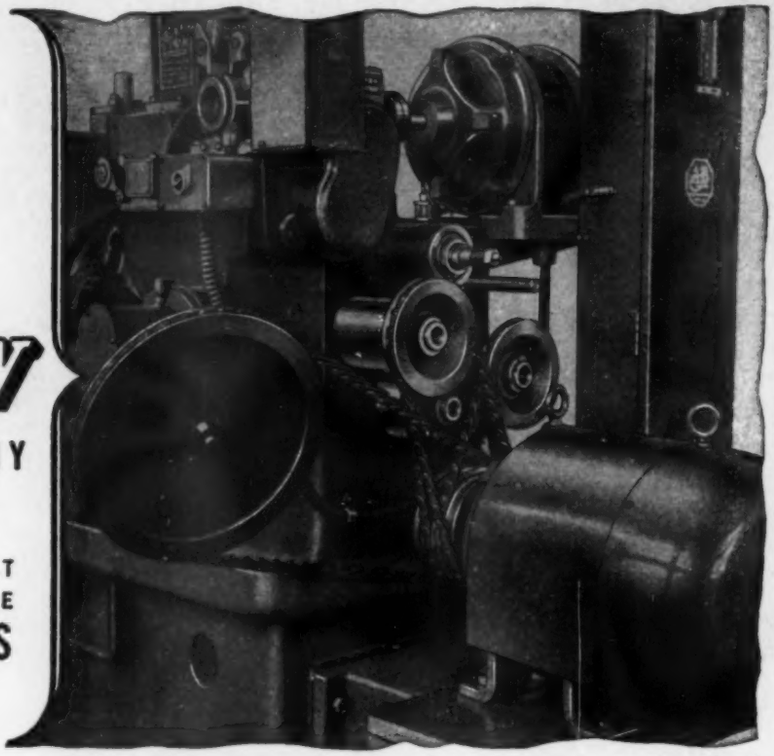
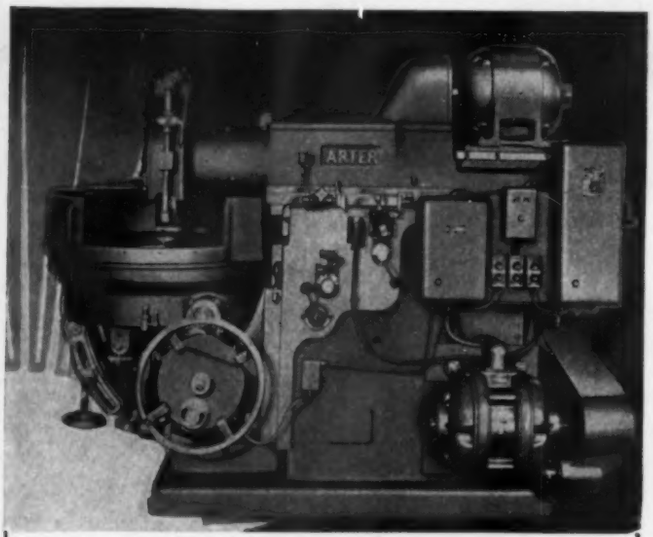
THE WORLD'S FINEST MULTIPLE SPINDLE

CHUCKING MACHINES





Arter Model B-24" Rotary Surface Grinder. Completely hydraulically operated. Built in four sizes—20", 24", 30", 40". Gives you extreme precision and high finish to meet the requirements of industry today. Complete details by return mail.

Prompt delivery.

ARTER GRINDING MACHINE COMPANY

Worcester 5, Massachusetts — U. S. A.

Any MICROMETER 1" to 18" size trued and lapped square

Pearson Precision "Micrometer Lapping Fixture" gives your plant constant *exact check* on all micrometers. Any good toolroom man can operate it expertly. No disassembling of micrometer other than removing spindle. Laps micrometer in exact right angle with center line of spindle; and in perfect alignment with end of micrometer spindle. Also makes an excellent comparator. Saving an hour's rejects may more than pay for this fixture.

Write for Literature

MANUFACTURED BY RED WING MOTOR CO., RED WING, MINN.

Put Your Stop Watch

on NICHOLSON EXPANDING MANDRELS

Test the time-saving possibilities of these widely used precision tools. Not infrequently time studies show operations can be completed in less time than was formerly consumed in looking for or turning a solid arbor. No parts to wear out and cause distortion. Sold singly or in sets; for bores ½" to 7". Bulletin 1043.

W.H.NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

Proven Performance

SELLS 6 OUT OF 10 GRAND RAPIDS GRINDERS

Of every ten Grand Rapids Hydraulic Feed Surface Grinders sold, six are to customers already using Gallmeyer and Livingston grinding machinery.

Such customer acceptance and approval is proof of the quality of Grand Rapids Grinders.

FEATURES

- 125 feet per minute longitudinal table speed
- Separate motors to drive grinding wheel spindle and hydraulic mechanism
- Two spindle speeds to reduce wheel costs
- Portable, self-contained motor driven coolant system
- Vickers vane type hydraulic pump
- Starters, controls and motors easily accessible
- Special G & L spindle motor end-bells and over-size precision ball bearings

SPECIFICATIONS

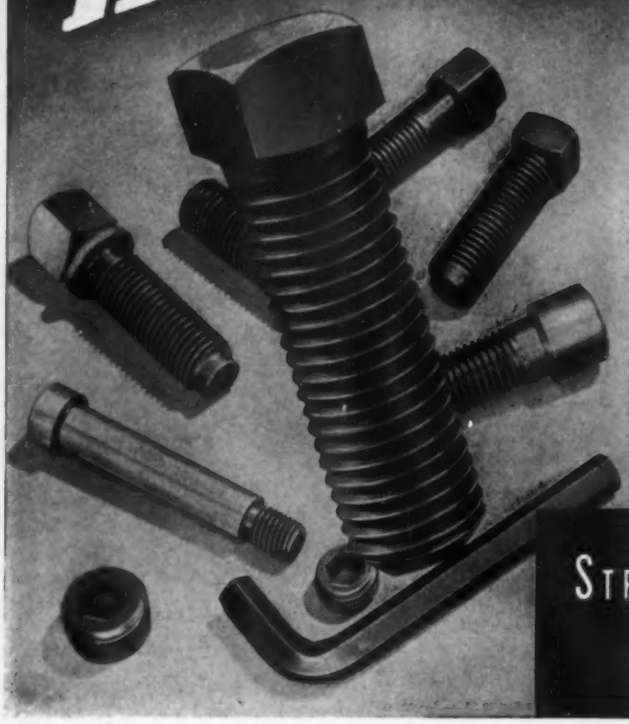
Automatic table travel—longitudinal 38", transverse 13½" • Working surface of table—12" x 36" • Standard wheel size—12" x 1" x 3" • Vertical movement of wheel head—18" • Spindle speeds—1925 and 2500 RPM • Floor space —150" wide x 102" deep

Write for Bulletin GL 101

• Patented vertical adjustment of wheel head. The large hand wheel is graduated in thousandths, the small one in tenths of thousandths.
• Bijur one-shot lubricating system insures long life for bearings, freedom from trouble and eliminates time spent in oiling.
• Heavy, rugged, one-piece column and base of very close-grained gray iron, cast in our own foundry, assures permanent alignment between cross travel ways and vertical head ways.
GRAND RAPIDS
GALLMEYER & LIVINGSTON CO.
GRAND RAPIDS, MICHIGAN, U.S.A.

GALLMEYER & LIVINGSTON COMPANY, 330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICHIGAN

Mac-it ALLOY STEEL SCREWS



Get EXTRA strength on EXTRA TOUGH JOBS with SQUARE HEAD SET SCREWS!

Mac-it Quality Square Head Set Screws have extra resistance and strength on jobs where they must take terrific punishment. No upsetting or mushrooming of points, no breaking off under the head. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

DISTRIBUTED NATIONALLY BY
STRONG, CARLISLE & HAMMOND COMPANY
CLEVELAND 13, OHIO
MANUFACTURED BY
MAC-IT PARTS COMPANY LANCASTER, PA.

DIE CUSHIONS THAT MODERNIZE YOUR DIE CONSTRUCTION AND DESIGN

ADAPTABLE TO ALL DEEP DRAWING PRESS OPERATIONS.

Self-contained unit, quickly installed on any punch press.

Furnished with hardened and ground pin pressure pad.

DIE CUSHION PISTON DIAMETER	5"	6"	8"	10"	12"	14"	16"
MAXIMUM DRAW	2"	2½"	3"	3"	3"	4"	5"
DRAW RING HOLDING PRESSURE (in tons)	.9	1.4	2.5	3.9	5.7	7.7	10.0
SHIPPING WEIGHT (approx. lbs.)	66	138	150	200	310	450	650

Write for Catalog No. 100-1

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7, MINNESOTA

Severance CARBIDE MIDGET MILLS

Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C

¾ SIZE

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May be REGROUND time-after-time by Severance—savings are thus multiplied

SEVERANCE TOOL INDUSTRIES, INC.
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HOLMAN *BETTER, FASTER HOLE FINISHING*

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

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A card addressed to any of our offices will bring a qualified engineer right to your door.

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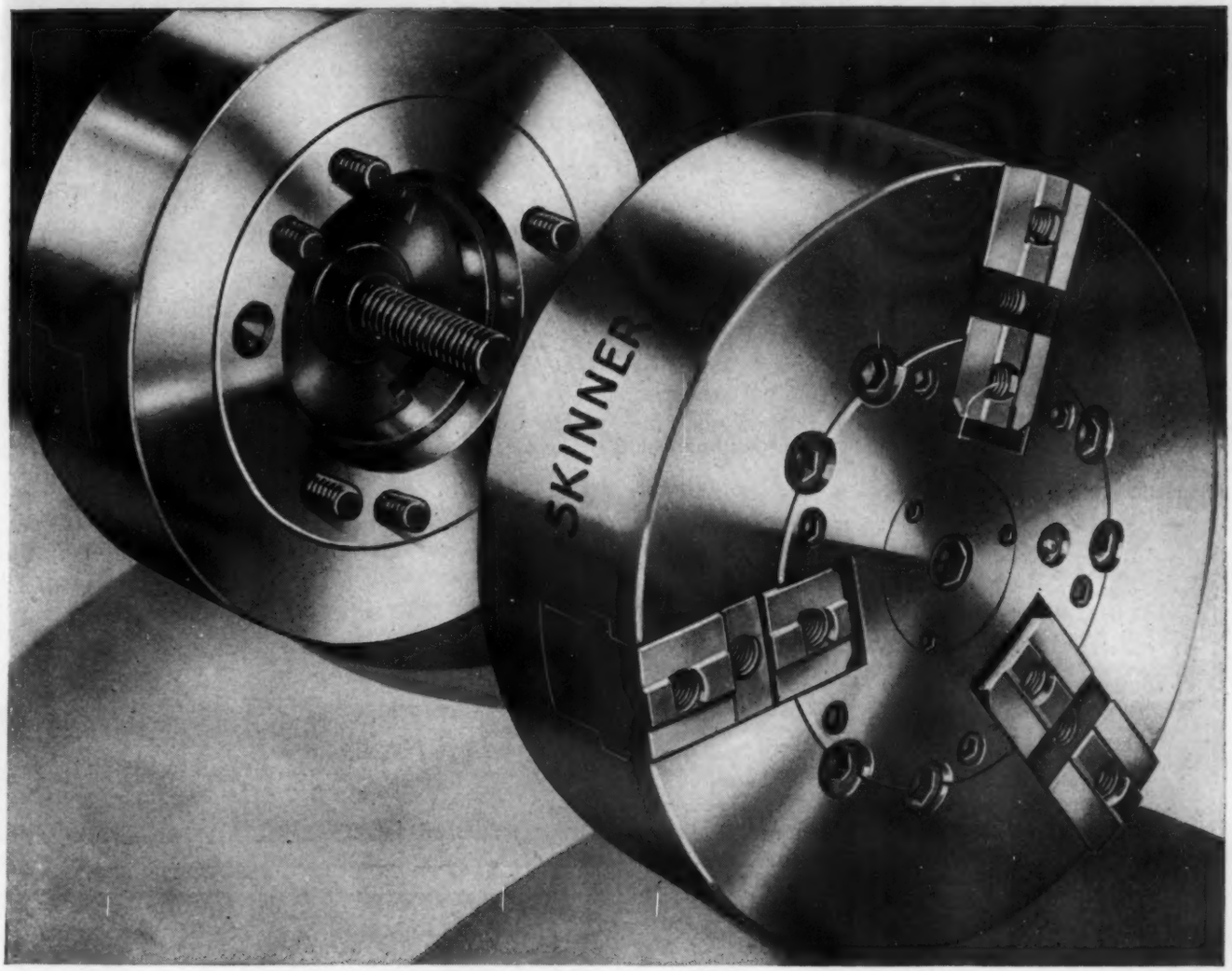


FRONT & REAR VIEW SERIES 1300

Blue Chip Investment . . .

With a Skinner Power Chuck, work can be chucked so fast and so easily that production increases while operator fatigue is reduced. And because they are functionally designed and accurately constructed, production is more precise as well. Skinner Power Chucks are "Blue Chip" investments — bound to return good dividends for years and years.

These modern labor-saving devices have only four moving parts — a wedge and three jaws. This simplicity of construction results in several outstanding features. Initial accuracy of a high degree is more easily achieved and, with so few moving parts, it is maintained for a much longer time. A forged steel body of ample proportions to withstand strains far greater than will ever be met, yet machined so accurately as to be in perfect balance, permits the use of higher cutting speeds for the efficient use of carbide cutting tools.

In addition, a special wedge angle design gives greater gripping power and offers a wider margin of safety. *Once a Skinner Chuck grips the work it will not release, even if the air is completely cut off, until the operator is ready to remove the piece.* (See this remarkable demonstration at the Skinner Exhibit in Booth 638 at the Machine Tool Show!)

Power chucking with a Skinner Chuck is a time-saving method that offers "Blue Chip" attractions to any manufacturer who invests in machine tools today. Full details on this accurate, long-lived, cost-cutting equipment are contained in the Skinner Catalog No. 59. Write for it today.

The Skinner Chuck Co.

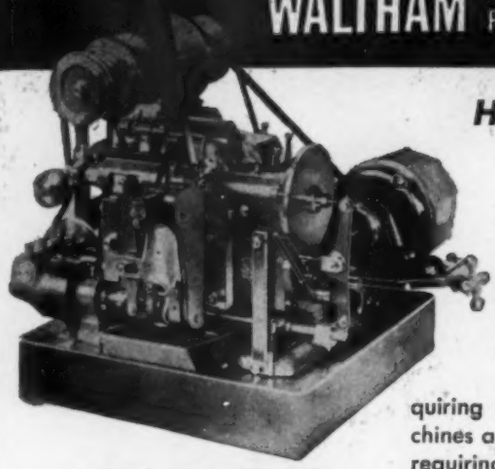
343 CHURCH STREET, NEW BRITAIN, CONN.

Skinner Chucks

SKINNER CHUCKS
THE CREST OF QUALITY

HAND & POWER OPERATED MACHINE CHUCKS – AIR CHUCK EQUIPMENT – FACE PLATE JAWS – MACHINE VISES

WALTHAM PINION & GEAR CUTTING MACHINES

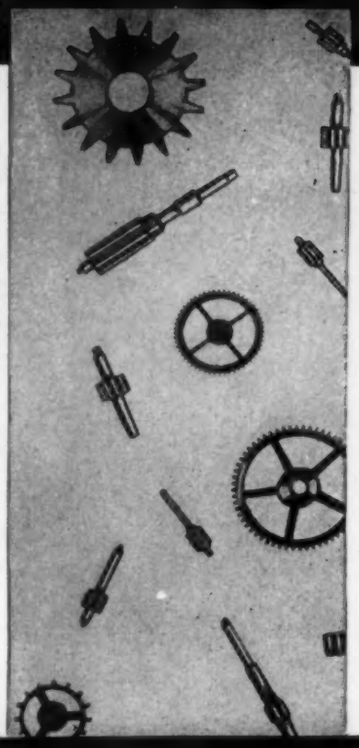


Highly productive—fast and accurate

These machines—made in single-cut, multiple-cut and magazine-feed types—are designed for the fast, precision production of gears and pinions for watches, instruments, fuses, etc. They are simple to operate, requiring no special skill. Magazine-feed machines are fully automatic, the other machines requiring positioning of blank and starting by hand.

Drive for these machines is either from countershaft or by individual motor. On motor driven machines, V-belts drive cutter spindle, worm shaft and pump.

Illustrated literature and detailed specifications are available promptly on request.



SPECIFICATIONS

PINION MACHINES

Diameter capacity, approx. ½"
Coarsest pitch about 32 D.P.
Strokes of Work slide for pinions—.24" to .45"
Strokes of work slide for stacked gears —.85 to 1"

GEAR MACHINES

Pitch diameter, capacity 1½"
Strokes for work slide, .40", .65", 1.00", 1.25"

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.

WHY NOT USE A 3 PURPOSE CUTTING OIL

And that's FISKE DARL OIL. It is a base cutting oil that can be used straight or reduced, is non-corrosive, works on ferrous and non-ferrous metals, has visibility and exceptional anti-weld value. DARL is just as effective for drawing and stamping as it is for cutting. FISKE OILS are sold on a "results" basis. Write today.

FISKE
Metal Working
LUBRICANTS
FISKE BROTHERS REFINING COMPANY
NEWARK 5, N. J. *Established 1870* TOLEDO 3, OHIO

BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V&O Press Co.
HUDSON, N. Y.

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4098

L-W MAGNETIC CHUCKS

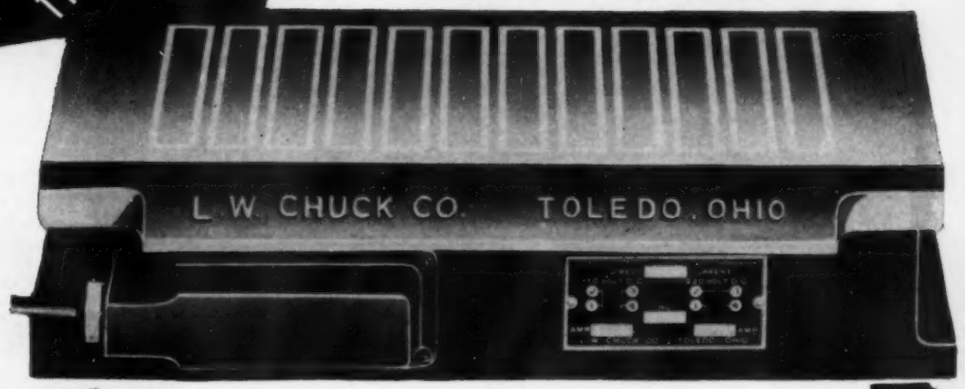
GUARANTEED WATERPROOF FOR WET OR DRY GRINDING
•
MAXIMUM HOLDING POWER
•
LONG LIFE CONSTRUCTION
•
FOR OPERATION ON 110 OR 220-VOLT D.C.

5¾" x 13"
$47.65

6½" x 18"
$63.15

8" x 24"
$109.30

10¾" x 37"
$202.05



DEMAGNETIZERS

A single pass over the stationary poles is sufficient to completely demagnetize work that has become magnetized through induction. Model B-2 for large work, complete with pilot light signal, switch and cord. Operates on 110 volts A.C. current. 7¾" wide, 12½" long, 6¾" high. Shipping weight 55 lbs. . . . $63.20

Model J-1 for small work, complete with switch and cord. 7¼" wide, 7¼" long, 6¾" high. Shipping weight 35 lbs. $41.15

RECTIFIERS

For converting A.C. into D.C. for use on magnetic chucks. A.C. input 110 volts. D.C. output 110 volts. For continuous duty and long life.

P-1 for 5¾"x13" chuck 0.8 amps. $38.75
P-2 for 6½"x18" chuck 1.0 amps. $45.00
P-3 for 8"x24", 10¾"x37" chuck 3.0 amps. $60.00

DEMAGNETIZING SWITCHES

for use on our 5¾" x 13" and 6½"x 18" sizes. When the switch is thrown to "ON" position, the chuck is magnetized, and the work held firmly for grinding. When the work is to be released, the switch is thrown to "DEMAG" and contacts are touched momentarily to neutralize the chuck. $8.90

Field discharge type for 8"x 24" and 10¾"x 37" $16.25

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 25 SO. ST. CLAIR ST. TOLEDO 4, OHIO

BARRETT "FILWHIRL" ENAMELERS make easy work of many difficult coating problems

The Barrett "Filwhirl" is a Centrifugal Enameler providing a clean, sure and economical way of applying finishing materials to parts or products that can be rotated in fair balance in the revolving bowl. It wastes no coating material, and reduces time and expense when compared with other methods of applying a good commercial finish. It is designed for bulk handling, and can be depended upon for speedy production requirements.

It has proven highly successful in the coating of helical springs, clips, clasps, zipper parts, bead and link chain, toys, automobile and luggage hardware, misc. metal stampings, castings, etc. Excellent results are also obtained with japan, lacquers, varnishes, paints, waxes. No drips or fatty edges.

Furnished in spindle post, fixed bowl, and carrier types, in several capacities. Safety features included and auxiliary equipment is available.

Send a few representative samples to be processed and submitted for your examination.

The Barrett Centrifugal Enameler.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, WORCESTER, MASS.
Designers and Builders of Centrifugal Machinery

GEARS CAMS THREAD GRINDING

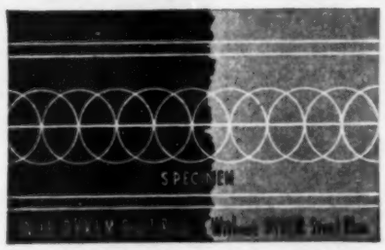
Any size or shape to utmost accuracy. For quotation on price and delivery Write Dept. G 2

HARTFORD *Special*

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 5, CONN.

DYKEM STEEL BLUE

STOPS LOSSES
making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301B North 11 St., St. Louis, Mo.
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THE PHOTOGRAPHERS ASS'N OF AMERICA
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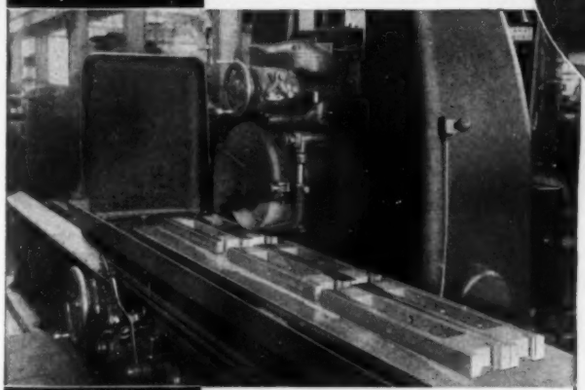
LARGE TABLE SPACE MEANS MORE PIECES PER LOAD AND GREATER PRODUCTION *with the Mattison Grinder*

● Cross Slide Draw Bars formerly ground 5 pieces at a time. Now ground on a Mattison Grinder 27 pieces per load. 50% time saving.

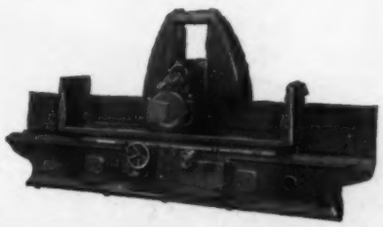
● Caps previously ground few at a time on small grinder. Now, Mattison Grinder handles 75 at a time. Time was reduced from 7 hours to 30 minutes.

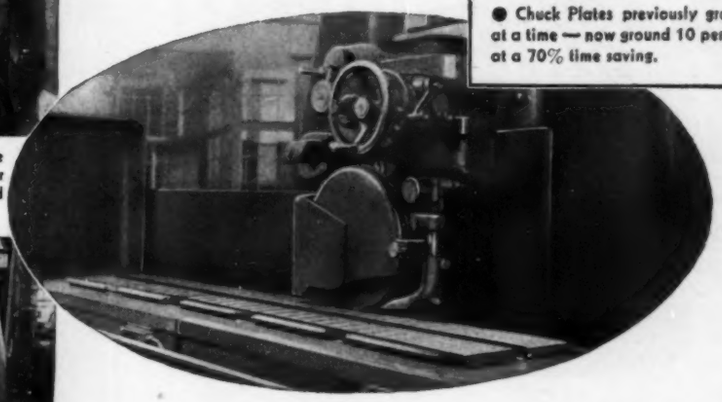


● Head Slide Guides formerly ground one at a time in 36 minutes — Now ground on a Mattison Grinder 9 pieces per set-up at a 77% time saving.

Examples: Grinding 75 pieces per load instead of 18 — cut time 80% . . . . . 10 pieces per, load instead of 2 — cut time 70%, etc.

Jobs shown indicate the possibilities for increased production by handling large quantities per set-up. In your efforts to obtain maximum production and lower cost, it will pay you to check into the capabilities of the Mattison Grinder.





● Chuck Plates previously ground 1 at a time — now ground 10 per set-up at a 70% time saving.

ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

Proof of LOWER PRODUCTION COSTS with REED Triple-Die Precision Thread Rolling!

600 ENDS AN HOUR

Part: STAYBOLT (for Railroad Equipment)
Thread: 34mm—10 Whitworth Form
Material: COPPER

Rolled on the REED Cylindrical-Die THREAD ROLLER Model A22

For complete specifications, write for Bulletin A22-1.

Prove it to your own satisfaction! Send us specifications of your work and let us roll samples. We will furnish production estimates and equipment costs.

REED A22
for
THREADING
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Valvair MEANS A Really Sensational Dependability . . .

EXCLUSIVE FEATURES

Valvair tandem type four-way valve with neutral position spring return FOR AIR ONLY.

Dependable—like the seasons and the migration of birds; practically a leak-proof, worry-proof line. Literally millions of operations at pressures up to 100 lbs. *and never a leak!* Good reasons: non-corrosive (cast bronze body, stainless steel parts); no trouble-making metal seats; no air limitations. Exclusive, proven features. A Valvair for every job: 2-way, 3-way, 4-way; 9 basic designs; 5 sizes (1/4"-1").

Ask for Catalog AA

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Valvair
2-WAY 3-WAY 4-WAY

D. A. Stuart Oil Co.
2729 SOUTH TROY STREET, CHICAGO 23, ILL.

STUART service goes with every barrel

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economicaly on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

Straight Side Press

ZEH & HAHNEMANN CO.
NEWARK N. J.
180 Vanderpool Street

FOUR REELS OF VEELOS REPLACE
316 SIZES OF ENDLESS V-BELTS
THE OLD-FASHIONED WAY
THE MODERN WAY
RIVE IT WITH A V-BELT
E IT BEST WITH VEELOS

Page 3—
New Veelos Catalog

See how VEELOS on Reels CUTS V-BELT INVENTORY to a Fraction . . .

Tested, Proved and Adopted by American Industry

WHEN you start using Veelos, the link V-belt, you stop buying spare sets of belts for each drive. You just don't need them. With only 4 reels of Veelos you can replace as many as 316 sizes of endless V-belts. Any length belt for any drive is easily uncoupled from a reel, quickly made endless and installed. Never again will you see an unused V-belt deteriorating in stock. Reels of Veelos take up little storage space . . . simplify stock records.

These are just a few of the many outstanding advantages of Veelos on reels explained in the new Veelos catalog. You'll also learn why Veelos costs far less to install, cuts machine downtime, ends the woes of endless V-belts. *Send for your free copy right away.*

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PENNSYLVANIA

VEELOS
THE LINK
V-BELT
Adjustable to any Length
Adaptable to any Drive

Known as VEELINK outside the United States

VITRIFIED

Keep production on its toes by standardizing on . . . .

VITRIFIED GRINDING WHEELS

The Vitrified complete line includes also Silicate, Shellac and Resinoid bonded wheels for conditions requiring high finish, elasticity and heat resistance.

Vitrified Wheels

Grinding equipment—for tools or for production requirements—can be brought to higher degrees of precision and speed by standardization of Grinding Wheels.

These objectives can easily be realized through the use of Vitrified Wheels for every grinding operation, because Vitrified offers a complete line of sizes, shapes and types, processed especially for the work to be handled.

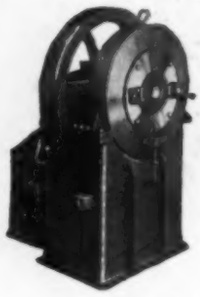
. . . Cast Iron, Bronze, etc., can be ground at low cost and efficiency on Vitrified Carborite Wheels.

. . . For accurate, fast grinding of steel on a production basis, Vitrified Borite Grinding Wheels increase output and reduce costs.

. . . Also, make Silicate, Shellac and Resinoid Bonded Wheels.

Ask a Vitrified representative to show you how economically you can modernize your grinding operations by standardizing on Vitrified Wheels.

VITRIFIED WHEEL CO.
WESTFIELD MASS.



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TORRINGTON
ROTARY
SWAGING MACHINE

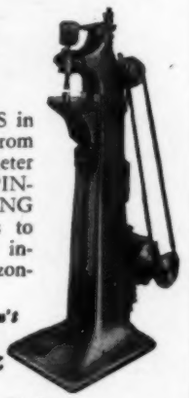
— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.
56 Field Street Torrington, Conn.

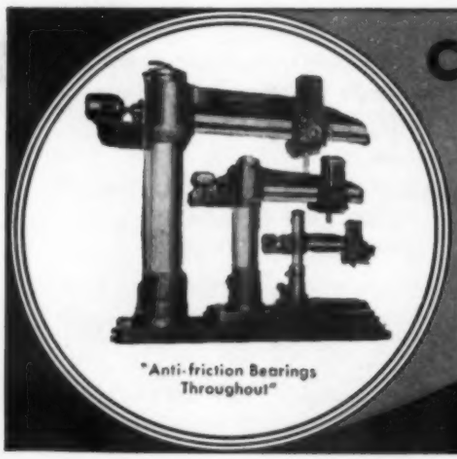
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



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FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

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MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

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The Parker 3-Piece Fitting

HOLDS BEYOND TUBE-BURSTING PRESSURES

Even if used under pressures severe enough to burst the tubing, PARKER *3-Piece* Tube Fittings remain intact . . . and do not leak or distort. Pictured is just one sample from thousands of tests that have been made—all with the same leakproof performance result.

PARKER Tube Fittings control vibration better. They're easy to assemble . . . may be reassembled repeatedly. Shapes are machined from high-strength forgings. Offered in the widest range of shapes and sizes in brass, steel, stainless steel—and aluminum. Two styles—*3-Piece* flare-type and flareless Ferulok. Warehouse stocks conveniently located in all major industrial centers.

Write today for Fittings Catalog 202, Ferulok Bulletin A-57 . . . and name of nearest distributor.

Parker

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ALLEN

ANNOUNCES

STAINLESS STEEL

HEX-SOCKET SCREWS

NOW CARRIED IN STOCK

A NEW ADDITION TO THE LINE

ALLEN HEAD

NON-CORRODING "ALLENS" for applications where steel is subject to excessive moisture, chemical fumes or corrosive vapors. Made of "18-8 Type" *Stainless,* non-heat treated, non-magnetic. Set screws: stock sizes #6 to ½" diameter; cap screws: #8 to ½". N. C. threads only. Class 3 fit; Allen precision fastenings. . . Order of your local Allen Distributor, or write us for samples and literature.

THE ALLEN MFG. COMPANY
HARTFORD 2, . . CONNECTICUT, U. S. A.

You can do any of these jobs FASTER-EASIER-BETTER with Strand Flexible Shaft Machines

Grinding · buffing · polishing · sanding · drilling reaming · rotary filing wire brushing · screw driving · nut setting · wood filler rubbing · rasping

Strand machines provide PORTABLE rotary power at CONSTANT speeds with dependable results and less operator fatigue. Ruggedly built for years of steady use. Hundreds of attachments easily interchanged—125 types and sizes—vertical and horizontal models from ⅛ to 3 H.P.

Distributors in all Principal Cities

Send for CATALOG showing complete line.

M-5

Strand FLEXIBLE SHAFTS

N. A. STRAND & CO.
5009 NO. WOLCOTT AVE.
CHICAGO 40 ILL.

The Cincinnati

WET ABRASIVE CUT-OFF MACHINE

. . . for straight or angle cutting of practically any material used in general manufacturing . . . including such metals as brass, copper, aluminum, as well as fibrous and plastic materials in various sizes, angles and shapes.

Suitable for making straight or angle cuts in solids up to 2¼" or tubing up to 3½" diameter. Same vise is suitable for various cuts. Maximum capacity is 2¼" in cutting angles up to 45°. Graduations on table make angle-cutting fast and accurate.

Alternating or direct current. Write for complete details.

TRADE The Cincinnati MARK
THE CINCINNATI ELECTRICAL TOOL CO.

WOODWORTH GAGES *ACCEPTED* BY ALL INDUSTRY.....!

GREEN—GO

RED—NOT GO

Industry by industry—coast to coast—wherever accuracy and durability count—Woodworth Company is winning and holding new friends—with the *ACCEPTED ADJUSTABLE THREAD RING GAGE.*

ACCURACY YOU CAN TRUST

SEND FOR—The new 1948 Woodworth Gage Catalog just off the presses. Requests for copies must be written on company letterheads.

★There's a Woodworth representative near to serve you. Write us for his name.

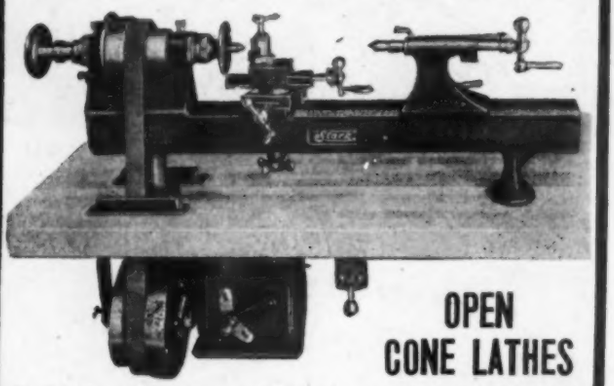
WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN

COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

Built-in infinitely adjustable drive with any speed at the turn of a convenient handwheel in front. No special bench or cabinet required. 156 to 2200 r.p.m. with Standard (toolroom) model and 220 to 3500 with High Speed (Manufacturing) model. Smooth brake and clutch. Capacity, ¾" or 1" through headstock; 9" swing, 40" length bed.

30 PRECISION ATTACHMENTS correctly designed for the very best facility and accuracy are interchangeable with all Starks of the same lathe size



OPEN CONE LATHES

Built in four good sizes, ¼" x 5⅞" swing, ½" x 7", ¾" x 9" and 1" x 9" with Stark Motor Drive Unit, the first compact, smooth under-bench drive, with 9 speeds—the full working range.

PRECISION BENCH MILLING MACHINES

Plain and spiral Models, motor-driven. Table 18" x 4", feed 10", transverse 3½", vertical over vise 4¾".

FOR EXACTING PRODUCTION it is fitted with fast lever feeds

Also "ELECTROBLAST" Muffle Furnaces

Gas fired. High speed steel temperatures in 20 minutes. Built in two small sizes.

FOR FURTHER INFORMATION, WRITE US.

Stark Tool Company

WALTHAM · MASSACHUSETTS

ESTABLISHED · 1862

Originators of the American Bench Lathe

THESE TICKLISH JOBS *were easy . . .*

For the Airflex Pneumatic Riveter

A plastic knife handle fastened to knife blade; a leather belt built up from links with long narrow rivets; a ceramic terminal part attached to metal clip with hollow brass rivets—these and other jobs in fragile materials or with long, slender rivets were no problem for the Airflex.

Bench or Pedestal Models

"Rotating Impact" successive pneumatic hammer blows distributed around rivet read by rotating peen. Only small cross-sectional rivet area receives impact; no stress transmitted to work. Available: Standard or Double-end (to rivet simultaneously both ends of toy wheel axle, etc.) Write for Bulletin 74.

Immediate Engineering Service . . . Immediate Delivery

Airflex PNEUMATIC Tools

LEMERT ENGINEERING CO.

"IN THE HOOSIER STATE SINCE 38"

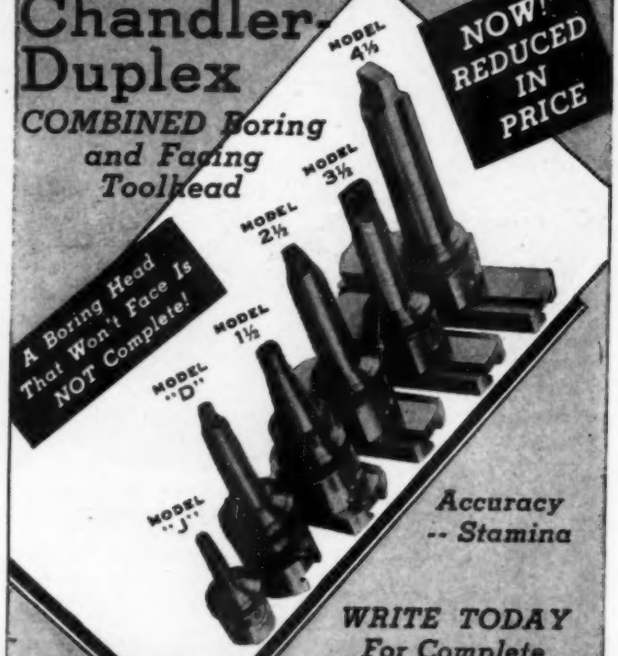
1207 N. Western, Plymouth, Indiana

For ANY Size Machine

Chandler-Duplex

COMBINED Boring and Facing Toolhead

NOW! REDUCED IN PRICE



A Boring Head That Won't Face Is NOT Complete!

Accuracy -- Stamina

WRITE TODAY For Complete Details . . . . .

A Few Openings For GOOD Distributors

CHANDLER TOOL CO.

MUNCIE, INDIANA, U. S. A.

Even if we split the difference . . .

These new Speed-Wet Discs are cutting 5 to 1 Better!

Actually the field engineer's report stated 4 to 6 better! Here's the "before and after" comparison. The job: grinding stove frames. Previous production average: one frame per disc. New production rate with Speed-Wet Metalite Fibre Discs: 4 to 6 frames per disc. Purchasing agent instructed: furnish "Behr-Manning only" on all future disc requisitions.

Ever since we released the new Speed-Wet Disc, we have received glowing reports like this from the field. Technically, the explanation of this extra production lies in three quality features: first, all-resin bonding for resistance to heat; second, all-Durabonded* coating for rugged grit anchorage; third, all-fibre backing for extreme flexural strength.

Thus there is every possibility that a job test of Speed-Wet Discs on your own work will improve your production too. We'll be glad to arrange it at your convenience — just write us on your company letterhead.

* *Reg. U. S. Pat. Off.*

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(DIVISION OF NORTON COMPANY)
TROY, N. Y.

EDWARD

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COMPANY

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An 8-page illustrated booklet containing

THE MOST MODERN, JOB-PROVED METHOD FOR GETTING THE MOST OUT OF TAPS

SEND FOR YOUR COPY TODAY

EDWARD BLAKE COMPANY
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Please send me your free booklet on PRECISION TAP SHARPENING (Bulletin No. 647) AM

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BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—
AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION
DRILL GRINDERS—WALTHAM CUTTER SHARPENERS—

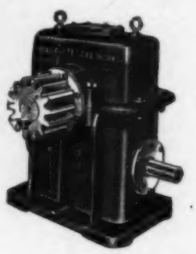
SPEED REDUCERS

AVAILABLE
TO BE MADE UP FOR
PROMPT DELIVERY
(SOME RATIOS IN STOCK)

WORM GEAR AND GYRO SPEED REDUCERS

Worm Gear Speed Reducers

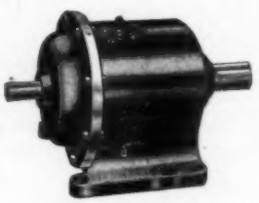
SIZE	QUANTITY	RATIO	INPUT H.P. 1750 RPM	RATING AT 1150 RPM
[illegible]	73	5 1/6 to 1	3.3	2.6
	143	10 to 1	2.5	2.
	15	15 to 1	1.85	1.5
	51	20 to 1	1.4	1.1
	9	25 to 1	1.0	.9
	74	30 to 1	.97	.78
	150	40 to 1	.74	.60
	73	50 to 1	.63	.50
	50	60 to 1	.50	.39
2-3/4 HT	5	5 2/3 to 1	5.7	4.7
	3	7 to 1	4.8	3.9
	16	10 to 1	4.4	3.3
	26	14 1/2 to 1	3.2	2.5
	9	20 to 1	2.4	1.9
	43	30 to 1	1.7	1.34
	24	40 to 1	1.22	1.00
	25	50 to 1	1.05	.84
	90	60 to 1	.85	.69
4HT or HA	3	5.8 to 1	6.5	5.3
	10	10 to 1	4.56	3.72
	13	16 1/2 to 1	3.2	2.63
	25	20 to 1	2.66	2.18
	50	30 to 1	1.93	1.56
	2	40 to 1	1.47	1.21
	23	45 to 1	1.31	1.08
	45	60 to 1	.99	.82



CATALOG 114

OFFERED Subject to Prior Sale

Write for prices and delivery dates



CATALOG 112

Gyro Speed Reducers

SIZE	QUAN.	RATIO	INPUT H.P. 1750 RPM	RATING AT 1150 RPM
G-7½	16	24 to 1	.87	.68
	9	30 to 1	.65	.50
	13	40 to 1	.48	.38
	8	50 to 1	.39	.30
	4	55 to 1	.35	.27
	10	60 to 1	.33	.25
	4	80 to 1	.25	.20
	4	100 to 1	.20	.18
	5	120 to 1	1/8	1/8
	3	200 to 1	1/8	1/8
	2	408 to 1	1/8	1/8
	4	480 to 1	1/8	1/8
G-15	7	30 to 1	1.3	.96
	9	40 to 1	.96	.74
	4	50 to 1	.77	.58
	35	60 to 1	.65	.47
	3	81-3/5 to 1	.50	.36
	55	120 to 1	.33	.25
	1	140 to 1	1/4	1/4
	1	360 to 1	1/4	1/4
G-25	8	40 to 1	1.5	1.
	9	50 to 1	1.25	.94
	39	60 to 1	1.04	.79
	1	66 to 1	.98	.70
	8	80 to 1	.80	.60
	9	100 to 1	.64	.44
	10	116 to 1	.55	.40
	28	118 to 1	.55	.40
	1	142 to 1	.40	.30
	10	200 to 1	.32	.25
	8	235 to 1	1/4	1/4
	1	247 to 1	1/4	1/4
	9	360 to 1	1/4	1/4
	7	480 to 1	1/4	1/4
	2	2080 to 1	1/4	1/4
G-40	2	36 to 1	4.2	3.00
	5	25 to 1	4.2	3.00
	4	30 to 1	3.8	2.8
	7	40 to 1	2.83	2.13
	6	50 to 1	2.27	1.74
	4	60 to 1	1.90	1.46
	3	101 to 1	1.1	.89
	4	120 to 1	.98	.75
	4	180 to 1	.66	.50
	1	240 to 1	.50	.38
	4	400 to 1	1/4	1/4
	3	480 to 1	1/4	1/4
	3	810 to 1	1/4	1/4
	4	1200 to 1	1/4	1/4

BRAD-FOOTE GEAR WORKS

1309 SO. CICERO AVE. CICERO, ILL. DEPT. A

The Old Oaken Bucket is now just a Song!

MOTHER CLANGED THE BELL beside the breezeway . . . down at the end of the corn row, a sweaty boy unhitched old Dapple for noonday dinner . . . then the old oaken bucket "rose from the well," and—long since vanished into the Land of Nostalgia.

True—no poet ever sang of a water faucet. Or tuned the praise of artesian wells. But the *modern* farmer goes for deep drilling. The reaper yields to the combine. New times breed new ways on the farm and in your factory.

Take cutting tools for example. Steel cutters are rapidly giving way to harder carbide-tipped cutters. Carbide tips cut faster, last longer, lift man-hour production, earn you more profit.

To illustrate—a certain plant recently mounted Nelco Carboloy-Tipped Cutters on its regular standard equipment. Its steel cutters, at top speed, had cut 100 slots in 3.2 hours. Nelco Carboloy-Tipped Cutters cut 100 slots *better* in 1.4 hours! We can cite scores of installations that point to the same conclusion:

Send for a Nelco Service Engineer now. Let him show you how a moderate investment in *modern* Carboloy-Tipped Cutters will pay you dividends aplenty.

WITHOUT OBLIGATION—SEND FOR THE NELCO 28-PAGE CATALOG

The complete line of Nelco Carboloy-Tipped Cutting Tools . . . illustrated . . . described . . . priced. Featuring pages of concise and valuable engineering data and charts. A copy should be in every shop . . . in every purchasing department. *Send for yours now.*

CARBOLOY-TIPPED CUTTING TOOLS

NELCO TOOL CO., INC.

FOR THAT EXTRA EDGE IN PRODUCTION

370 HAMILTON AVENUE, BROOKLYN 31, NEW YORK

3 ways Delta* Machine Tools help you cut operating costs

—without penalizing output and quality

DELTA MILWAUKEE
Delta 14" Metal-Cutting Band Saw (metal-cutting and wood-cutting)
Delta 17" Drill Press (for metal, wood, or plastics)
Delta Abrasive Belt Finishing Machine
Delta Cut-Off Machine

BY fully utilizing the portability and compactness of versatile Delta Machine Tools, you cut down your capital investment — and reduce your fixed overhead.

With low-cost, stock-model Delta components, you can:

1. Build high-production, special-purpose machines that can be readily converted to other uses, when changing conditions warrant; thus you save the heavy expense of buying costly special tools of limited usefulness;
2. Modernize obsolete machines, by replacing worn units;
3. Quickly revise or supplement production-line layouts for more efficient operation.

There is no compromise with quality, to bring you Delta's savings in cash, weight, and space; they result from advanced design and from quantity production of standard models.

Perhaps a study of Delta Machine Tools may suggest ways to help keep your costs down, even in the face of high wages and expensive raw materials. Discuss this with your Delta distributor. He is listed under "Tools" in the classified section of your telephone directory. Look for his name.

DELTA MFG. DIVISION
ROCKWELL MFG. COMPANY
MILWAUKEE 1, WISCONSIN
Gen. Sales Office • 6 NO. MICHIGAN AV., CHICAGO 2, ILL.

Mail coupon for free bulletins on Delta metalworking machines:

Bulletin A-14-3 pictures and describes Delta Super-Hi* Drill Presses, for small-hole work from .025" dia. to ¼".

Bulletin A-17 pictures and describes Delta 17-inch Drill Presses.

Bulletin A-20 pictures and describes Delta Cut-Off Machines.

Bulletin A-23 pictures and describes Delta Toolmaker* Surface Grinder, Chip-Breaker Grinder, Tool and Cutter Grinder.

Bulletin A-28 pictures and describes Delta Metal-Cutting Band Saw.

Bulletin A-31 pictures and describes Delta Abrasive Finishing Machines (belt and disk types).

Tear out coupon and mail today!

*Trade Mark Reg. U.S. Pat. Off.

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Send me free copies of the following Delta bulletins:

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Company.....

Address.....

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M-28

IT WAS A STEP FORWARD

When grampa changed from the

Old Flat Drill

to the

Modern Twist Drill

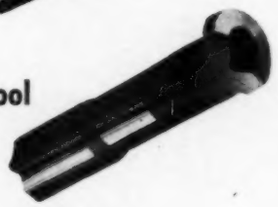
IT WILL BE ANOTHER STEP FORWARD

When YOU change from the

Old Hook Type Boring Tool

to the

Modern Precision Boring Tool



WITH the old type of tool the clearance is usually ground by hand; even an experienced operator finds it difficult to control the clearance angles.

With the Precision Bokum Boring Tool the proper clearance is built into the tool. All resharpening is done from the top surface only, in this respect the tool is like a form tool wrapped around a shank, the curvature being such that the clearance angle remains constant throughout the life of the tool. As with any form tool the life of the Bokum Boring Tool is many times that of an ordinary tool.

Available: Wide range of sizes for boring holes from 3/32" dia. up . . . in super high speed steel and Carbide Tipped.

For general boring, use Style A
For facing and bottoming, use Style B
For internal threading, use Style C

Ask for Catalog K1139 for high speed tools and K398 for carbide-tipped

BOKUM TOOL CO.
TRADE MARK REG. U.S. PAT. OFF.
14775 WILDEMERE AVE. - DETROIT 21, MICH.
SINGLE POINT BORING TOOLS · INTERNAL THREADING, BOTTOMING AND FACING TOOLS · CARBIDE TIPPED TOOLS

FEDERAL

The hand feels . . . the eye *knows*

Some hands are tough; some are sensitive. The strength of the same hand changes from day to day — even from hour to hour.

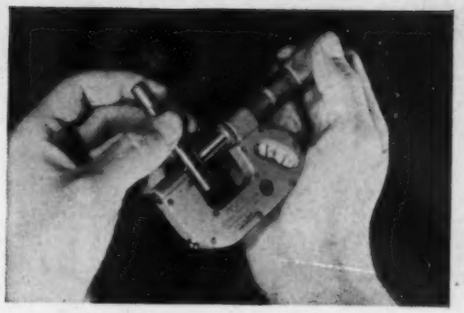
Visual gaging takes the human element out of testing and inspection operations. The Dial Indicator magnifies the variation in the workpiece to the point where it cannot be missed. The truth is there — *instantly*. Simultaneously, the amount of the variation is told.

Visual gaging is fast replacing older methods — for infinitely practical reasons. 1) *Precision* — to whatever degree your work requires. 2) *Fewer rejects* — the gaging tells instantly which pieces are correct, over and under size; the over size go back for further grinding. With inspection of selective sampling — right at the machine — variations are spotted, the machine's trend is discovered and corrected before it goes beyond tolerance limits. 3) *Speed* — all these steps mean fewer delays in production; errors caught before they multiply.

Think of Federal Dial Indicator Gages in terms of *speed* and *money-saving*, as much as in terms of *precision*. For full details on the gages here pictured — and many other types — write us for illustrated Catalog No. 104.

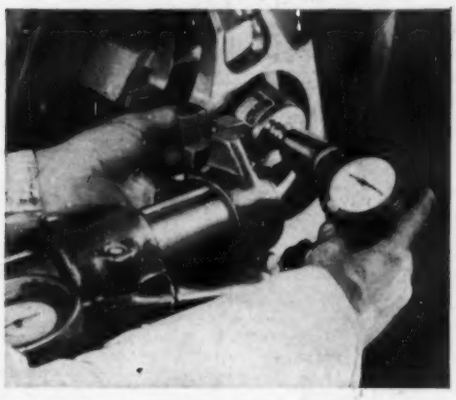
FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET • PROVIDENCE 1, R. I.

● Dimensional Dial Indicators and Indicating Gages — mechanical, electronic, air, multi-dimensional • Automatic Sorting • Dimensional Machine Control • Combinations of these methods.

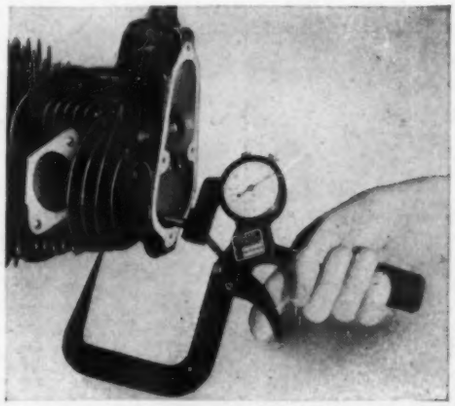


The Federal Mikemaster—Model 200 P-1. The Dial Indicator — in a top quality micrometer — shows precise measurements in tenths (.0001"). Instantly adjustable for use as a snap gage on job lots.

The Federal Testmaster—the all-purpose test indicator; adaptable to all tool posts, height and surface gages; for a multitude of year-round tests in laboratory, tool room and machine shop.



Federal Hole Gages—Series 1201—show the dimensional variation instantly and easily; many sizes and models — for shallow or deep holes, offset or blind holes.



Federal Caliper Gages—Series 49—for checking outside dimensions. The arms, made to order in special shapes and lengths, permit checks to be made over and around all types of obstructions.

Marks FASTER BETTER CHEAPER

SPEED MARKING AT ITS BEST

This Noblewest Rapid Precision Marking Machine is not only *streamlined* in appearance, but gives you *streamlined* performance in speed, quality of marking, at lower costs. Production speeds are practically unlimited. It can be tooled for marking many sizes and shapes of pieces. Employs the famous Noblewest *rolling process.* Model 157 shown here with pneumatic die pressure. Write Noble & Westbrook Manufacturing Co., 17 Westbrook St., East Hartford 8, Conn.

MARK IT BEST WITH

NOBLEWEST

Precision Marking Machines

FABRICATING ALUMINUM?

Let Farnham help!

. . . the trend is to light metals; more designers are indicating them in modern products and the light metals are plentiful.

New materials may present problems in production. Farnham engineers can plan techniques and build machinery that will smooth manufacturing difficulties. Farnham special machinery can save you money!

CALL FARNHAM FIRST! NO CHARGE FOR CONSULTATION OF COURSE

Other Farnham services include—

Metal fabricating and sub-contracting for complete units either machined or assembled.

FARNHAM

MANUFACTURING COMPANY

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Phone: Santa Monica, 5-4004

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Model C

RANDALL and STICKNEY Dial Gauges and Indicators

are accurate, reliable and built to stand the gaff of hard usage.

This Model C Dial Indicator has a 2½ in. diameter dial, with 50 or 100 divisions. Can be furnished in graduations of .001-in., .0005 in. or .01 mm. Has a ½-in. range movable dial easily set at zero.

The cases on all R. & S. Gauges are made from sturdy castings. The case and plate are two separate units so that repairs can be made easily.

There is a R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

FRANK E. RANDALL CO.
248 Ash St.
Waltham 54, Mass., U. S. A.
Makers of Dial Gauges Since 1885

QUALITY GEARS CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

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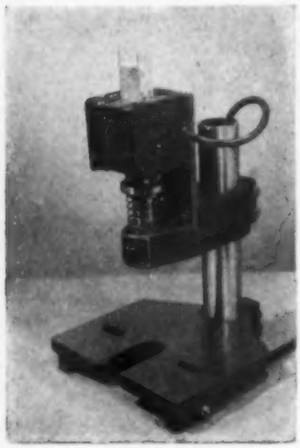
946 Dorchester Avenue Boston, Mass.



WHAT A PUNCH!

2250 pounds impact 6000 strokes per hour

For performance with a capital "P", put the new Model BH Electropunch to work on your production line. 2250 lb.* impact, up to 6000 accurate strokes per hour — Electropunch is the quick, effective punch that answers your problems in wire cutting, stapling, marking, riveting, piercing, blanking, drawing, etc. For lighter operations, Electropunch is also available in an economical Junior Model with 1250 lbs. impact.

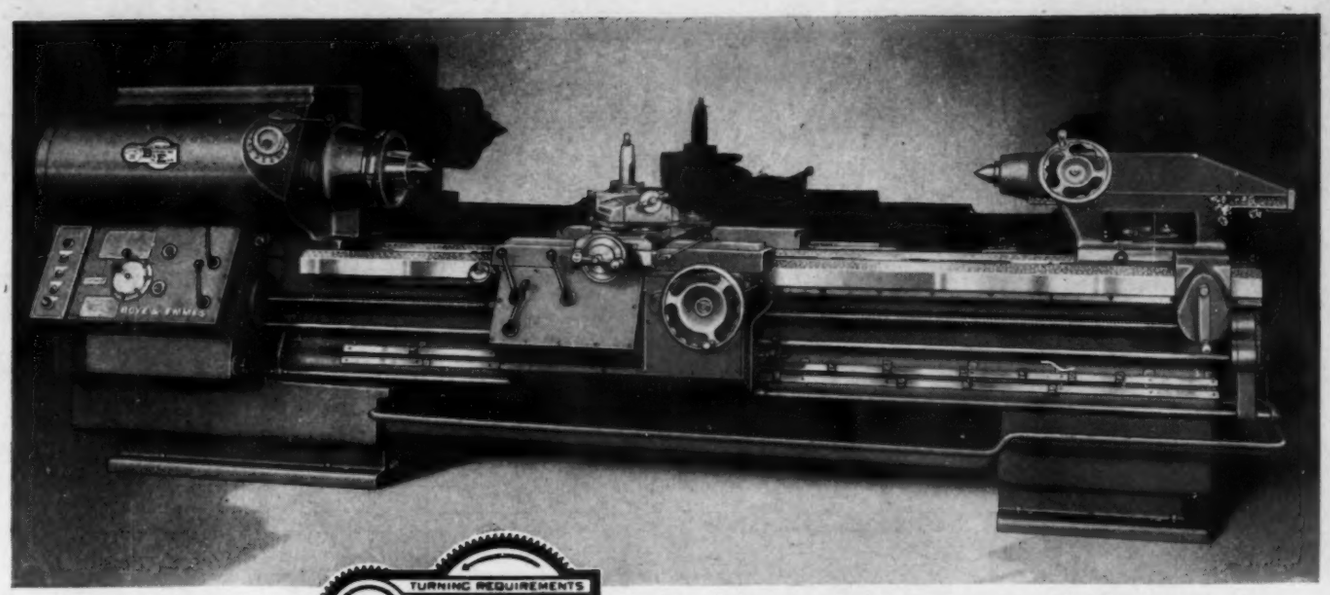
Both sizes feature:

- Solenoid operation, spring return spindles
- Simple, rugged construction—minimum of parts to wear
- Requires less than 1 foot of bench space
- Operates on any 110 volt, 60 cycle AC line
- Feather-touch operating button
- Sturdy foot switch available at slight extra cost

Write for bulletin containing more complete information.

*By using variable transformer (furnished at slight extra cost) impact can be varied through a continuous range up to this maximum.

DEPT. F. **Black & Webster Inc.,** 126 Massachusetts Ave. Boston 15, Mass.



TURNING REQUIREMENTS
LATHES ONLY — FOR 50 YEARS
BEGINNING B & E TO END

Golden anniversary model, the talk of the recent Machine Tool Show

CLEAN LOOKING AS A WHITE

QUIET AS A VERY LITTLE

SMOOTH RUNNING AS YOUR

EFFICIENT AS A COLONY OF

You'll need this bulletin to quickly grasp the *many* improvements in this "golden" model. Please write on your firm's letterhead or mail coupon.

BOYÉ & EMMES

MACHINE TOOL COMPANY

127 Caldwell Road **Cincinnati 15, Ohio**

Gentlemen—Please send bulletin to

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★

HOLIDAY GREETINGS

★ ★ With the approach of the Holiday Season we like to turn our minds from business cares and give personal thought to customers and friends who have so loyally contributed their part to make the year pleasant and profitable. To them now we extend sincere Holiday greetings with the old-time wish that they may enjoy the merriest of a Merry Christmas and the happiest of a Happy New Year.

THE WELDON TOOL CO. Cleveland 4, Ohio

3000 WOODHILL ROAD

Available Again

"MILLING CUTTERS and HOW TO USE THEM"

An authoritative presentation on a subject of vital interest to every machine shop supervisor.

This handy booklet, originally a series of 12 illustrated articles which appeared in *American Machinist*, is available again. Original demand for this practical, helpful working guide to the use of milling cutters was so heavy that we have reprinted the series and bound them in a convenient 36-page booklet for your use.

Completely covering the operation of milling cutters, this series treats many specific problems, including the use of cutter materials; heat-treatment in developing cutting properties; direction of cut; rake, clearance and relief angles; sharpening cutters; grinding wheels. Diagrams and tables add to the practical value of this reprint as a handy reference.

Supply is limited, so if you need more than 25 copies better order now.

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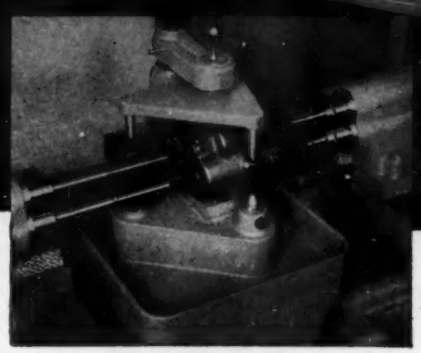
Ex-Cell-O Way-Type Precision Boring Machines Offer Specialized Multiple Operation at Low Cost

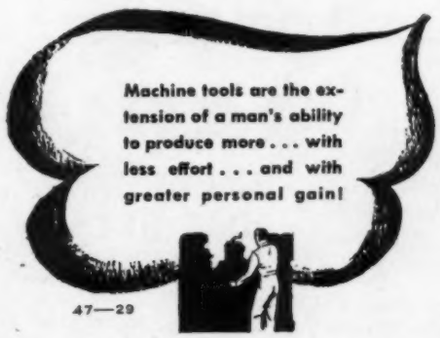
XLO

Illustrated here is an Ex-Cell-O Two Way Precision Boring Machine designed for boring holes in cast iron automotive transmission cases. To meet production requirements it was necessary to bore the holes at both ends at the same time.



Above: Special cluster spindles are required here because of close center distances of bored holes. Because boring bars at left are long and slender the ends are further lengthened to engage pilot bushings in the fixture.

Ex-Cell-O Way machines are made to order for work like that illustrated here. They are built up from standard way units that can be operated simultaneously or in sequence as the work requires. Way machines do the work of special machines, but the use of standard units keeps the first cost low and, as production requirements change, the units may be rearranged to accommodate different work. Ex-Cell-O One Way Precision Boring Machines are especially suitable for heavy or awkward work. Two Way Machines accommodate awkward and long work pieces and save time by boring from both sides simultaneously. Three and Four Way Machines are particularly suitable for boring holes perpendicular to one another. An important feature of Way Machines is that multiple operations are performed from the same work locating points, with only one handling of the parts.



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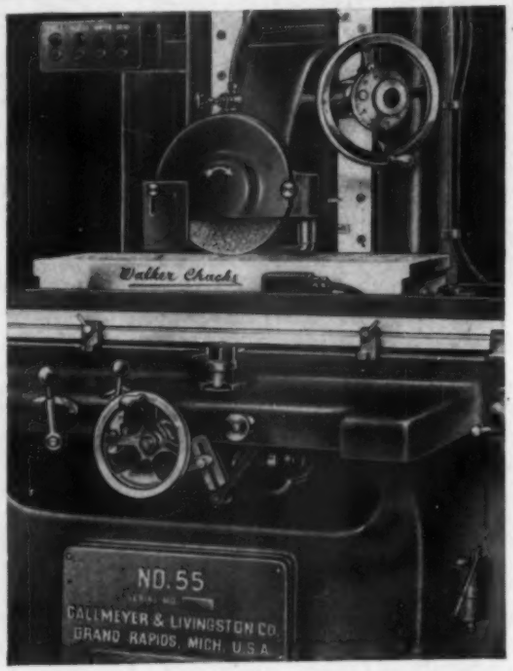

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Fig.1432 Pat'd

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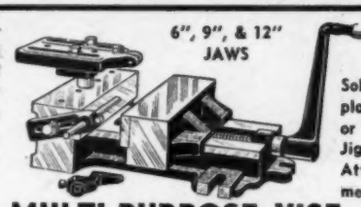

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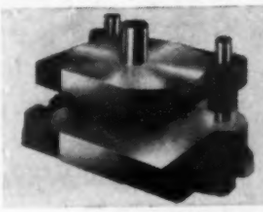

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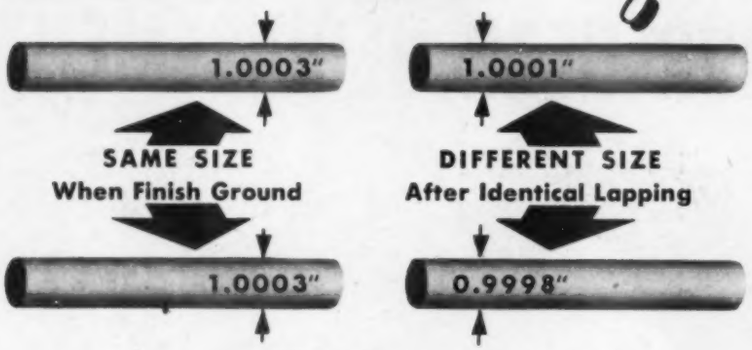
What's the Answer to THIS one?



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HERE'S what happened—and what may be happening in **your own** production department:

The two parts shown above at left were both finish-ground to 1.0003". The upper part, however, had a surface roughness of 10 microinches, while the lower part—identical in appearance and "feel"—had a 20-microinch finish. Thus the latter part, with deeper "hills and valleys", had less metal to be removed per unit of thickness, and was undersize after lapping.

Obviously, it's entirely a matter of ***initial surface roughness.***

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FOREMAN—COLD Heading and Trimming department small shop in middle west, in reply detail experience and salary expected. P-2139, American Machinist.

(Continued on page 286)

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Should be experienced in design and development of medium and heavy precision machine tools. Permanent positions offered. When replying by mail, supply details of experiences, references and salary expected; or phone Big Rapids 445.

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Man with 10 to 15 years' experience in steel foundry to check engineering designs for good foundry practices. Some grey iron and malleable iron used and ability to determine when these could be substituted for steel castings would be desirable. Location Pacific Coast.
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24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G.
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Lodge & Shipley geared head
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Drive
16"x6' Lodge & Shipley Geared Head
14x8' Rockford, Q.C.G. Collets
14"x8' Pratt & Whitney, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' American, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x3' Craftsman, Bench, M. Drive
11"x4' Sidney, Q.C.G. Floor Type
11"x3' South Bend, Q.C.G. M. Drive
10"x24" Logan, Q.C.G. (new) in stock
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Morey #2 Geared Head, 1" Cap.
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Gisholt #4, Univ. 2" Cap.
W-Swasey #2A, Univ. 2½" Cap.
Gisholt #5, Univ. 2½" Cap.
W-Swasey #3A, Univ. 3½" Cap.
Bullard 42" Vert. Turret

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#2 Cinci. Univ. Tool & Cutter
#1 B&S, 10x24, Univ. Cylindrical
"A" Norton, 10x18 Cylindrical
"A" Norton, 10x72 Cylindrical
"A" Norton, 10x84 Cylindrical
#2 Norton, 10x32 Univ. Tool & Cutter
#11 B&S 10x30 Cylindrical
#10 B&S 6x18 Cylindrical
#4 B&S Univ. 12x60 Cylindrical
#12 Greenfield, Internal Hydromatic
#70 Heald, Internal, Grinds 11" deep
#2 Cinci. 6x36 Univ. Cylindrical
#2 Cinci. Centerless, Motor Dr.
#51 Oliver, Drill Pointers, 1½" cap.
24" Blount Wet Grinder
Besley Dble. End Disc, 30" Discs
#2 B&S Automatic 6x18 Surface
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Blanchard #16 Vertical, M. Dr.
Gorton Dble. End, 18" Discs
Pratt-Whitney 14x36 Vert. Surface
Abrasive #33 Vert. Surface, Automatic
#2 B&S Face Grinder, M. Drive

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Niagara, 6'x18 ga. Squaring Shear
Lown, 6'x16 ga. Slip Rolls, M. Dr.
Lennox Splitting Shear, ¾" Cap.
Lennox Bevel Shear, ¼" Cap. M. Dr.
Peckstow, Power Seaming Machine
Racine 6x6 Shear-Cut Hack Saw

MILLING MACHINES

#2 Van Norman Horiz. Knee Type
#3 Cinci. Vertical, Dial Type
#1M Kent-Owens, Horiz. Mill
#1½B Milwaukee, Dble. Overarm
#2B Milwaukee, Dble. Overarm
#3B Milwaukee, Dble. Overarm
#2B Milwaukee, Univ. Horiz.
#2 Cincin. Univ. Horiz.
Cinci. 36x72 Hydrotel
#2 Van Norman, Duplex Mill
#4 Cinci Vert. High Power
#2 Kempsmith, Horiz. Plain
#1 Kempsmith, Horiz. Plain
#5C Becker Vertical Mill
#3, #4, #5 Cinci. Horiz. Mills.
#31 Lucas, Horiz. Boring, 3" Bar
#0 Giddings & Lewis, Horiz. Boring Mill—3" Bar

DRILLING MACHINES

Natco #12, 20 Spdles. 3/16" Cap.
Natco #D6, 24 Spdles. 5/16" Cap.
Natco #D5, 14 Spdles. 5/16" Cap.
Fox #15, 54 Spdles. #1 m.t.
Minster #2D, Sgle. Spdle. Upright, compound table, #5 m.t.
Cinci-Bickford, 3½' arm, 9" col. Radial
Cinci-Bickford, 4' arm, 11" col. Radial
Cinci-Bickford, 5' arm, 13" col. Radial
Fosdick, 5' arm, 14" col. Radial
Cinci-Bickford, 6' arm, 15" col. Radial

SHAPERS & PLANERS

Pratt-Whitney Vert. Shaper, 6", M. Dr.
Logan 7" Horiz. Shaper, Motor Drive
Machinery Sales 16" Crank Shaper
Gould & Eberhardt 16" Crank Shaper
Gould & Eberhardt 24" Crank Shaper
American 24" Crank Shaper
New Haven 12" Vertical Shaper
Whitcombe, 24x24x6 Planer
Niles-B-P, Shaper-Planer, 20x20x24
Ingersoll Planer Type Mill 30x30x16
Betts, 120"x72"x35' Planer
Ingersoll Planer Type Mill, 30x30x12

POWER PRESSES

Standard #1 "A", 6 tons, floor type
Bliss #68C Double Action Press
Hilles & Jones #4 Single End Punch & S Shear, 48" Throat, equipped as Plate
Shear with 18" Blades, Cap.—1¼" thru 1"
Bliss #18 O.B.I., 11 tons, 1½" str.
Bliss #76½B, Single Crank Geared Press, 7" Shaft, 3" Stroke with Air Cushion
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Caldwell, 200 Tons, Hydraulic, Horizontal Wheel Press, 36" dia. Capacity
Lucas 15 Tons, Power Arbor Press
Bliss-Consolidated #163B, S.S. Dble. Crank Press—Bed 42"x24"—6" Stroke
Clearing 200 Tons, S.S. 10" Stroke
Federal #5 O.B.I. 49 Tons, M. Dr.
Michigan O.B.I. 36 Tons Cap.—2" Stroke
General 8 Tons, Flexible Power Press, M. Dr.
Ferracute #EG52 Geared Coining Press, 150 Tons Cap.—Up Moving Ram
Baxendale O.B.I. 11 Tons, 1½" Stroke
Zeh & Hahneman, Single Action Cam Press, Spring Return Type—35 Tons Capacity

LATHES

6"x15" Sundstrand, Model C
8"x15" Sundstrand, Model D
10"x22" Sundstrand, Model AA
12"x18" Lipe Carbo, Motor Drive
12"x5' Sebastian
14"x6' Hendey
18"x8' American Grd. Hd.
20"x10' Lodge & Shipley
20"x25" Fay
22"x48" Centers Monarch (1942)
24"-48"x14' cc Rahn-Larmon Gap Lathe
36"x30' Lodge & Shipley Triple Geared Head, two carriages
50"x17' cc LeBlond Geared Head

MILLING MACHINES

No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. Dial Type
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical (1942)
24" Cincinnati Production
No. 2—18" Cin. Auto. R. and F. (1941)
No. 4—48" Cin. Hydro. Tracer Control (1942)
No. 5—48" Cin. Hydro. (1942)
No. 45—48" Cin. Hydro. Duplex Tracer (1943)
No. 56-90 Cin. Hydro. (1943)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
6"x36" Lees-Bradner Thread Miller
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

ReMANUFACTURED -(ORIGINATED BY US)- MACHINE TOOLS

Reg. U.S. Patent Office

DRILLS

No. 121 Baker
No. 217 Baker—(1943)
No. D-8 Colburn No. 8 M. T.
No. 2 LMS—26"—1 Spdl. L-G (1944)
No. 2 LMS—20"—2 Spdl. L-G (1944)
No. 2 LMS—26"—2 Spdl. L-G (1945)
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—14"—4 Spdl. L-G
No. 4 BM—24"—4 Spdl. Fosdick
No. 2 LMS—26"—4 Spdl. L-G
No. 2 LMS—26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
3'-11" Col. Cinn.-Gilbert
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS

34" King
36" Rogers
42" Bullard New Era
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HOR. BOR. MILLS

No. 31—9" Bar Lucas
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES

No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

PLANERS

36"x36"x12' Cincinnati, 4 Heads

MISCELLANEOUS

Model H-7 Micromatic Vert. Honer
2500 Ton Lake Erie Hydraulic Press
No. 22-C Racine Shear Cut Hack Saw

TURRET LATHES

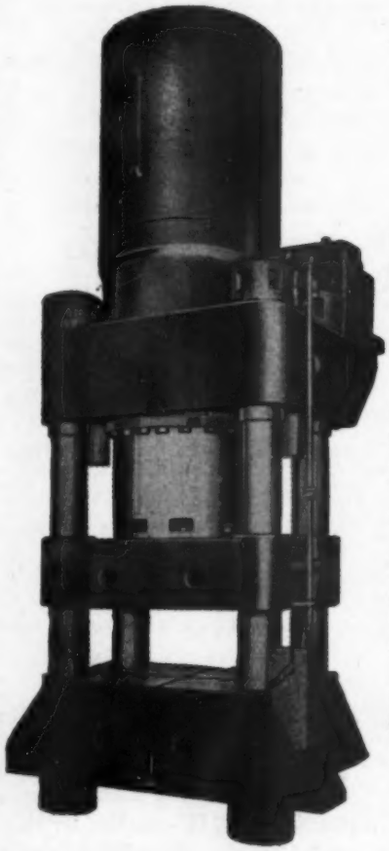
No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson (1942)
No. 4 Gisholt (1942)
No. 5 Warner & Swasey, air chucks (1941)
No. 5 Bardons & Oliver
No. 5 Foster, A.C. & Bar Feed
2-A Warner & Swasey
6R Denver
18" Libby, 3½" H.S.
No. 49-675—New Britain Gridley—7½" Cap.

GRINDERS

6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C Plain (1943)
16"x72" Norton Type C Plain (1943)
Norton Motor Driven Plain Grinders 6"x18" to 24"x240"
10"x24" Landis Type C Universal
12"x36" Landis Type LCH Universal (1945)
12"x48" Cincinnati Universal
16"x16"x48" Thompson Hydr. Surface
No. 22—12" Heald Rotary Surface
No. 25—16" Heald Rotary Surface (1942)
10"x72" Colonial Broach Grinder
No. 49 Excello Carbide Tool Grdr.

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BLVD. **CHICAGO 6, ILL.**



1300 TON WATSON STILLMAN HYDRAULIC PRESS Self Contained

Platen size 48" x 42". Stroke 22". Opening 37. Ram Diameter 35". Driven by 50 H.P. Motor, Also

600 TON ELMES PRESS

Self contained 48x45" between rods, 36" stroke, 66" openings, 75 H.P. motor, 3 phase, 60 cycle, 220v.

1320 TON PRESS, SELF CONTAINED

600 Ton Self Contained Lake Erie Double Action Press with 175 Ton Cushion Cylinder. Distance between rods 48"x60", Stroke 30", opening 48".

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#5B Heavy, Brown & Sharpe Plain Miller, geared head, single pulley drive.....$1000

#500 Standard Automatic Drop Hammer, late model...$2500

#1-M Cincinnati Plain Miller, geared head and motor driven $1600

26" Stockbridge Crank Shaper, back gears, power down feed, motor driven $1500

1½" cap. Foote-Burt single spindle automatic screw machine, motor driven, new 1940, cost new $7000 .....$2000

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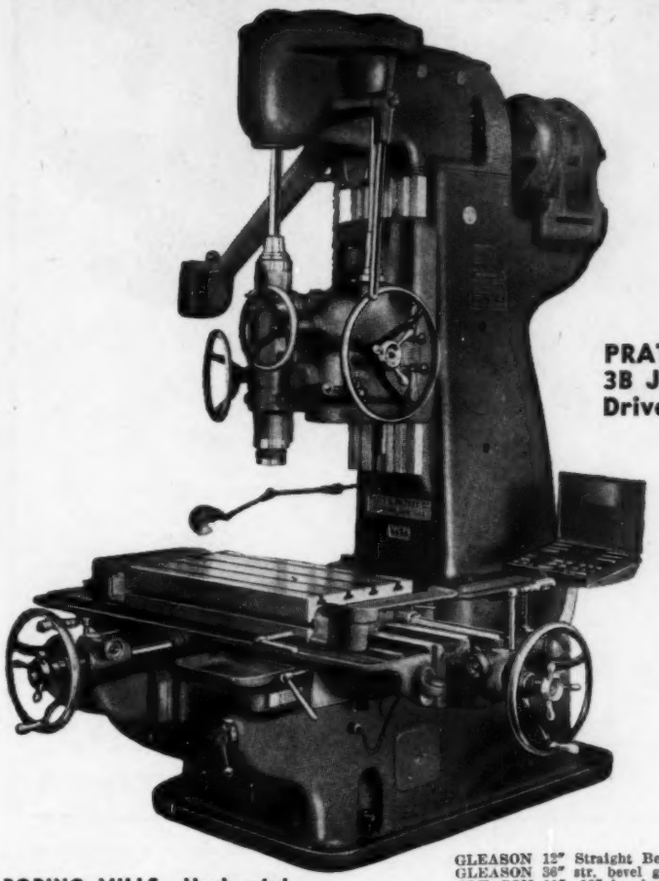

PRATT & WHITNEY 3B Jig Borer Motor Drive, Latest Type

BORING MILLS—Horizontal

DETRICK & HARVEY 4", 5" bar, Floor Type
GIDDINGS & LEWIS #32—3⅛" bar, M.D.
LUCAS #31 3" bar, M.D.
LANDIS #35, 3½" bar, Floor Type
MORTON 60" traveling hd., combination borer, miller and driller, M.D.
NILES BEMENT POND 4½" bar, Motor Drive
NILES BEMENT POND 5", 6", 7" bar, floor type, M.D.

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC, M.D.
BETTS (Consolidated) 84"—3 heads, AC, Latest
BULLARD 16"—6 spindle Mult-Au-Matic—Type D—Single indexing—Latest Type
BULLARD 24", 36" vertical turret, New Era Type, M.D.
BULLARD 54" Maxi-mill, 2 swivel hds., M.D.
KING 36" Vertical Turret, M.D., Latest Type
NILES 62", 73", 100" swivel heads—PRT, Motor Drive

BROACHES

LaPOINTE #4L, Horiz., hyd., latest type
LaPOINTE #SRV-25-66, 1054, Vertical Surface, hyd., latest type

DRILLS

AMERICAN 3'11" Hole Wizard Radial—Latest Type
AMERICAN 5'13", 7'10" plain radial, M.D.
BAUSE #3, 4—Adjustable Multiple Spindle—M.D.
CARLTON 6'15", plain radial, M.D.
NATCO B4A—Multiple Spindle, Hyd.—Latest Type
NATCO B4B—Adj. Multiple Spindle, Hyd.—Latest
NATCO Model D5—Adjustable Multiple Spindle—Latest
WESTERN 5'18", 6'20" Radial—Latest Type

GEAR CUTTING EQUIPMENT

BARBER & COLMAN #3 Hobber, Latest Type
BARBER & COLMAN #3 Hob Sharpener, Latest Type
BROWN & SHARPE No. 3H gear cutter, M.D.
CROSS #73 univ. Chamferer, Latest
FELLOWS #61, 615A, 645A3, 7, 7A, 72, 75A, 77, High Speed Gear Shapers, latest type
GLEASON 12" Straight Bevel Generator, Latest Type
GLEASON 36" str. bevel gear planer, M.D.
GLEASON 11", 18" bevel generator, M.D.
GOULD & EBERHARDT 12H, 24H, 36H, 48H universal hobber, latest type
GOULD & EBERHARDT 12HS Hobber, latest
PRATT & WHITNEY 10" Grinder, hyd., latest
SCHUHARDT & SCHUTTE #1, #2 with diff., M.D.

GRINDERS—Cyl.—Plain & Univ.

BROWNE & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, latest type
CINCINNATI 6x18 plain Model EA, hyd., latest type
LANDIS 4x18, Type H, hyd., latest type
LANDIS 6x18, Type "C" Hyd., Latest Type
LANDIS 30x220" Plain, Roll, Motor Drive
NORTON 16x72" Univ., Hyd., Type C, latest
NORTON 16x72" Plain Type "C", latest type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hyd.—latest type
BLANCHARD #11—16" chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
BLANCHARD No. 16A—Dial Type—motor drive
BLANCHARD #27-18 M.D., Latest Type
GALLMEYER & LIVINGSTON #35, 8x24" Hyd., latest
GALLMEYER & LIVINGSTON #55, 12x36", hyd., latest
HANCHETT Series 300—12x48 hydl., vert. spdl., latest
HEALD #22, 12" chuck, Rotary, latest type
NORTON 6"x18"—Hyd.—Latest Type
NORTON 10x36 Hyd., Latest Type
THOMPSON 8x12x24 Hyd., latest type
THOMPSON 16x30x48 Hyd., Latest Type

JIG BORER

PRATT & WHITNEY 3B, Motor Drive, Latest

LATHES—Engine and Mfg.

BETTS BRIDGEFORD 60"x24' bed, swing 84"
BRIDGEFORD 36"x28' 36"x32' bed—2 car., M.D.
HENDEY 14x8' geared, Engine, M.D.
HENDEY 12x30" centers, TIMKEN, latest type
JONES & LAMSON "Fay" 20"x25" automatic, TIMKEN, latest type
LEBLOND 13"x4', 17"x5', 17"x14' bed, Rapid Production, Timken Bearing, latest type
LEHMANN 16x30, hydratrol, Timken, latest type
LODGE & SHIPLEY 16/20"x30" centers, Timken bearing, latest type
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, Latest
MONARCH 16x28" centers, geared hd., M.D.
MONARCH 36x108" Centers, Timken, latest type
MONARCH 12"x30" centers, Timken, Latest Type
NILES 42"x60", double head, motor drive
NILES 48x35' centers, Heavvy Duty, 2 carriage, Timken Bearing, PRT, Latest Type
NILES 60x10', 35', 40' centers, 1 or 2 carriages, Timken Bearing, PRT, Latest Type
NILES 72"x62' centers, combination Boring and Turning, Motor Drive
NILES 30x50' Boring, Timken, Latest Type
REED PRENTICE 27"x15', 20' centers, geared M.D.
REED PRENTICE 16x24" centers, geared hd., M.D.
REED PRENTICE 20x54" centers, Timken, latest type
SPRINGFIELD 16x48" centers, geared hd., M.D.
SPRINGFIELD 16x24" centers, geared hd., M.D.
SUNDSTRAND 8x15", 12x22" stub, automatic, TIMKEN, latest type
WARD HAGGAS & SMITH 18/36"x16' bed, Gap

LATHES—Turret

CINCINNATI ACME No. 1, No. 5W, Latest
GISHOLT #3, 5, Univ., Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest Type
JONES & LAMSON #3, 7C, 8A, Universal, Timken Bearing, Latest Type
MOREY No. 2G, No. 3, No. 4, Timken, latest
LIBBY 1H-5, 5½ hole, Timken, Latest
POTTER & JOHNSTON #5D2E, 5DE, TIMKEN, latest type
WARNER & SWASEY 3A, Universal 6" bar capacity, Timken Bearing, Latest Type
WARNER & SWASEY #5 Univ., Latest Type
WARNER & SWASEY #1A, 4A, Univ., Latest Type

MILLING MACHINES—Mfg.

CINCINNATI 3-24 Duplex Hydromatic, latest type
CINCINNATI 24", 48" duplex, TIMKEN, M.D.
INGERSOLL 32x24x16' Planer Type, 2 heads, AC, M.D.
TAYLOR & FENN M-80 Duplex Spline, latest type

MILLING MACHINES—Plain

BROWN & SHARPE #12 Timken Bearing, latest
CINCINNATI 1-12, 2-24 Timken, latest type
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI #2, #3 Dial Type, Timken, latest
CINCINNATI #4, 4S, 5, Timken Bearing, M.D.
CINCINNATI 0-8 Automatic rise and fall, Timken Latest Type
KEARNEY & TRECKER 121P simplex, TIMKEN, latest type
KEARNEY & TRECKER #4 heavy, TIMKEN, latest
KEMPSMITH #2, Model G, Timken, Latest
KEMPSMITH No. 4 Maximiller—Timken—latest

MILLING MACHINES—Vertical

CINCINNATI No. 3, No. 4 High-Powered, M.D.
CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
GORTON 8D superspeed, latest type
GORTON 9J superspeed, with duplicator complete, latest type
REED PRENTICE #5 die sinker, latest type
REED PRENTICE 3VG with Hydraulic Duplicator, Timken Bearing, latest type

PLANERS

CHAUDLER 36x36x20', 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84x84x18', 4 heads, DC, M.D.
NILES BEMENT POND 48x48x16', 2 heads, AC, M.D.
CHIC 42x42x20'—2 heads, AC, M.D.

SHAPERS

LAMAIRE 18' Vert. Hydraulic—latest type
LYND FARQUHAR 26" Openside, Motor Drive
MOREY 8", 10", 12", 14" Vertical, latest type
MORTON 48" Draw Cut, Motor Drive
PRATT & WHITNEY 6' 10" Vertical, M.D.

MISCELLANEOUS

BARNES #172, Vertical Hone, Latest Type
BILLINGS & SPENCER 1500 pound drop hammer
BIRDSBORO 325 ton vertical hyd. press, latest type
DoALL V-36, Saw—Latest Type
FERRACUTE DG-55, 75 ton Drawing Press, Tie Rod, 17" stroke, Latest Type
JONES & LAMSON 6x15", 8x18" thread grinders, latest type
LANDIS 1" Bolt Threader—Latest Type
MORTON 60" combination traveling hd., planer, miller and borer, M.D.
PRATT & WHITNEY "Keller" Type G, Type BL2410—Latest Type

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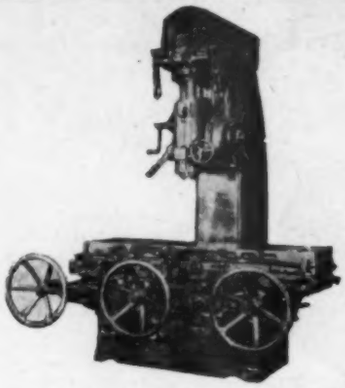
MACHINE,
table 68" x 16",
motor drive



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MACHINE and
DIE SINKER
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44" x 10½"
motor
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No. 1 Brown & Sharpe
No. 2 Cincinnati
No. 2½B Milwaukee
No. 3 Cincinnati
No. 3 Brown & Sharpe
No. 4 Cincinnati
No. 4 Kempsmith
No. 4K Milwaukee
No. 5 Becker
No. 6 Becker

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UNUSUAL VALUES

Milling Machines—#1, Universal, #1 American (new) plain, #1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe #3—26", Gould & Eberhardt 42".

Grinders—Cylinder, B & S #11, Planer type 16"x36", Surface 13"x62", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x8', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized. Large stock 10" and 12" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 36", 40".

SPECIAL—Now totally enclosed, dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt #25—24" Hi Duty. 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—12"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
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HIGH SPEED PLAIN & SIDE MILLING CUTTERS

H.S. PLAIN CUTTERS

3"x ¼" x1"	$2.00	ea.
3"x5/16"x1"	2.16	ea.
3"x ⅜" x1"	2.28	ea.
3"x ½" x1¼"	2.60	ea.
3"x ⅝" x1¼"	2.76	ea.
3"x ¾" x1¼"	3.00	ea.
3"x ⅞" x1¼"	3.24	ea.
3"x1" x1¼"	3.48	ea.
3"x1¼" x1¼"	3.86	ea.
3"x1½" x1¼"	4.40	ea.

H.S. SIDE CUTTERS

2½"x¼" x ⅜"	$2.16	ea.
3" x5/16"x1"	2.60	ea.
3" x⅜" x1"	2.88	ea.
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4" x¾" x1¼"	5.00	ea.
4" x⅞" x1¼"	5.70	ea.
5" x⅝" x1¼"	7.00	ea.
5" x¾" x1¼"	8.00	ea.
5" x⅞" x1"	10.00	ea.
5" x1" x1"	10.00	ea.

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PRESSES

STRAIGHT SIDE—60 ton, 5" stroke, 48x24 bed, late model Waterbury Farrell (15).
90 ton, 8" stroke, 50x18 bed, Bliss (3).
200 ton, 32" stroke, 27x27 bed, Bliss.
100 ton, 4 stroke, 21x21 bed, 15½" shut height, Bliss.
70 ton, 4" stroke, 22x22 bed, 15" shut height, Toledo.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss, $850.00 ea.
100 ton, 4" stroke, 21x27 bed, 110 strokes per min., Bliss.
115 ton, 4" stroke, 21x28 bed, $2250.00 (3).

INCLINABLE PRESSES, BRAND NEW — #2½A Bliss, brand new, w/cushions, 6" stroke, 18" shut height (3).
#5 Federal, brand new, 4" stroke, 38¾"x8" bed.
55 ton Walsh, brand new, 3½" stroke, 9" shut height.
15 ton, new, $363.00; 4½ ton, new, $165.00.
HORN—50 ton, Bliss, 4½" stroke.
40 ton, Consolidated, 2" stroke.
35 ton, Toledo, 2" stroke.
Seton Bliss, 1½" stroke.

AUTOMATICS

1⅝" Acme Gridley, 6 spdl. latest type (2).
2¼" Cone, 6 spdl., latest type (4).
16" 8 spdl. Bullard Multaumatics, pract. new, $5000.00 ea. (5).

PLATE SHEAR & BRAKE

¾"x10' Plate Shear, Williams & White. ½"x10' Power Press Brake, Henderson. Just taken out of operation. Both machines with motors, controls, immediate delivery.
SPOT WELDERS & BUTT WELDERS, Prompt delivery, 5-300 KVA, Brand new, guaranteed.

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72", 10 ga. cap.
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HORIZONTAL BORING MILLS

3½" Cincinnati-Gilbert Table Type, m.d., latest type
3½" Cincinnati-Gilbert Floor Type, m.d., latest type
6" bar Sellers Floor Type, m.d., with 2" auxiliary spindle, floor plate 144x180", latest type
2½" Cleveland, m.d.
No. 21, 31, 32, 33 Lucas Table Type, m.d.
4" bar Detrick & Harvey Floor Type, m.d.
4" Niles Table Type, m.d.
4½" Niles Table Type, m.d.
5½" Niles Table Type, m.d.
Morton 60" stroke Boring Mill and Traveling Head Planer, m.d.
10" bar Sellers Floor Type, m.d.

RADIAL DRILLS

3'-9" Column American Hole Wizard, m.d., latest
3' American Sensitive, belt
4'-9" column Cincinnati-Bickford Super-Service, m.d., latest
4'-11" American Triple Purpose, m.d.
4' Niles-Bement-Pond Semi-Universal, m.d.
5'-13" American Triple Geared, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d.
5' Prentice Plain, motorized
6' American Triple Purpose, m.d. on base
6'-15" Carlton, gear box
6' Cincinnati-Bickford, m.d. on base
6' Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
8'-16" American Triple Purpose, m.d. on arm
10'-22" American Triple Purpose, m.d. on arm
8'-19" American Triple Purpose, d.c. m.d. on arm, 1942 machine

UPRIGHT DRILLS

21" Cincinnati-Bickford, m.d.
30" Rich, m.d.
32" Aurora, belt
40" Aurora, belted m.d.
H3 Barnes Hydram, m.d.
D4 Colburn, m.d.
D8 Colburn, s.p.d.
No. 25 Foote-Burt, s.p.d.
No. 36HD Baker H.D., m.d.
No. 262 Barnes All Geared, m.d. latest (3)

GEAR SHAPERS

No. 6, 61 Fellows, belt
No. 7, 7A, 71A Fellows, m.d.
No. 18 Fellows Finishing Machine, m.d.
No. 61A Fellows, m.d., latest
No. 64-S Fellows, m.d.
No. 615A Fellows, m.d., latest
No. 645A3 Fellows, m.d., latest

GEAR GRINDERS

No. 13LS Fellows Lapper, m.d.
10" Pratt & Whitney Hydraulic Spur & Helical Gear Grinders, m.d.
No. 2HS Lees-Bradner Spur & Helical Gear Grinders, m.d.

GEAR HOBBERS

Type A Barber-Colman, m.d., latest
No. 3 Precision Barber-Colman, m.d., latest (3)
Type T Barber-Colman, m.d., latest
No. 12 Barber-Colman Double Overarm, long bed type
No. 34 Brown & Sharpe, m.d.
No. 44 Brown & Sharpe, m.d.
No. 36H Gould & Eberhardt, m.d.
48" Cleveland, m.d.
No. 96H Gould & Eberhardt, m.d.

GEAR CUTTERS

3 spindle Gould & Eberhardt No. 36BM Vertical Rougher
Gleason Spur Gear Testing Machine, m.d.
No. 1 Brown & Sharpe Spur Gear Tester
No. 3—26" Brown & Sharpe Spur Gear Cutter, m.d.
No. 6—60" Brown & Sharpe, m.d.
3" Gleason Straight Bevel, m.d.
8" Gleason Mfg. Type Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
12" Gleason Straight Bevel, m.d.
Cincinnati Gear Burnisher, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
Cross Gear Tooth Rounder, m.d.

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. ⅜" valve stems

CYLINDER GRINDERS

No. 50 Heald Hydraulic, m.d., brand new
No. 55 Heald, m.d.
No. 73 Heald Airplane Cylinder, m.d., new

PLAIN CYLINDRICAL GRINDERS

No. 5 Brown & Sharpe 3x18", m.d., latest
6x18" Landis, m.d.
6x18" Cincinnati Plain Hydraulic, m.d.
6x30" Cincinnati Hydraulic, m.d., latest
6x32" Fitchburg Type A, m.d., latest
8x18" Cincinnati Saddle Type, m.d.
8x36" Cincinnati Saddle Type, m.d.
No. 10 and 11 Brown & Sharpe, m.d.
10x24 and 10x72" Landis Self-Contained, m.d.
10x36" Cincinnati Hydraulic, m.d.
10x48" Landis Type C Hydraulic, m.d., latest
12x36" and 12x96" Landis Self-Contained, m.d.
14x48" and 14x72" Cincinnati Self-Contained, m.d.
14x52" Norton, motorized
20x120" Landis Self-Contained, m.d.
26"x96" Landis Self-Contained, m.d.

DISC GRINDERS

No. 4 Gardner, m.d.
No. 20 Gardner Comb. Disc Grinder and Roll Sander, m.d.
7½ H.P. United States, new, 18" discs
7½ H.P. Standard, new, 18" discs

INTERNAL GRINDERS

No. 16A—16" Bryant, m.d.
No. 16—22" Bryant Hydraulic, m.d., latest
No. 16RS Bryant, m.d., latest
No. 6, 10, 20 Bryant, belt
No. 9 Cincinnati, belt
No. 24—21" Bryant, m.d.
No. 49 Heald Single End Borematic, m.d.
No. 70 Heald, belt
No. 72A Heald Plain, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A5 Heald Plain, m.d., latest
No. 72A5 Heald, long bed type, m.d., latest
No. 72A5 Heald Sizematic, m.d.
No. 73 Heald Airplane Cylinder, m.d., new, latest
No. 74 Heald, m.d., late
No. 172 Heald Cap, m.d., brand new

SURFACE GRINDERS

10x24" Norton, m.d., latest
No. 5 Brown & Sharpe Hydraulic, m.d., latest
No. 5 Thompson Hydraulic, m.d., latest
14" Pratt & Whitney Vertical, m.d.
16" Arter A3 Rotary, m.d., new
Builders Co. Hand, 8x4" chuck
No. 10 Blanchard, m.d.
No. 11 Blanchard, m.d., latest
No. 16 Blanchard, m.d., 26" chuck
No. 18 Blanchard, m.d., 30" chuck, latest
No. 25-A—16" Heald Rotary, m.d., latest
No. 25A—24" Heald Rotary, m.d., latest
22" Pratt & Whitney Vertical Type B, m.d.
No. 22—12" Heald Rotary, m.d.
No. 33 Abrasive Vertical, m.d.
No. 260—16" Heald, belt
30"x18"x6' Springfield Planer Type, m.d.
54" Bridgeport Knife, belt
No. 5C—60"x16" Thompson, m.d.

THREAD GRINDERS

No. 33 Excello Precision, m.d., latest

BROACHING MACHINES

Oil Gear Hydraulic type XA, m.d.
Colonial VAS-5-42, m.d., latest
No. 4 LaPointe, gear box
Cincinnati Mill Broach, 10" spindle, m.d.
No. 75 HP LaPointe Horizontal Hydraulic, 37½ tons cap., latest type

BALL BEARING DRILLS

No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2½ Allen, m.d., latest
No. 5M—16" Fosdick, m.d.
Providence Eng. Co. Model E
2 spindle No. 2 Avey MA6, latest
2 spindle No. 2 Avey, belted m.d.
2 spindle 21" Canedy-Otto, m.d.
3 spindle No. 2 Motor Avey type MA6, latest
3 spindle No. 3 Avey, with power feed and tapper
4 spindle No. 2 Avey, m.d.
4 spindle No. 2 Avey, p.f. and tapper
4 spindle No. 2 MA6 Avey, latest, p.f.
4 spindle Delta, m.d.
4 spindle Gardam, belt
6 spindle No. 3 Avey MA6, latest

MULTIPLE SPINDLE DRILLS

No. 3 Baush, 16x30" head, 15 spindles
D13H Natco Hydraulic, 18x12" head, 10 spindles
2 spindle No. 262 Barnes Self-Oiling, latest (2)
3 spindle 12" Rockford Gang, m.d.
4 spindle 21" Cincinnati-Bickford, m.d.
4 spindle Foote-Burt Rail, m.d.
No. 16 Fixed Center Foote-Burt Rail, m.d.

HORIZONTAL DRILLS

No. 1B-50" Pratt & Whitney Deep Hole, m.d., latest
No. ½Bx50" Pratt & Whitney Chambering Machine, m.d.
No. 1, 1½ Pratt & Whitney Deep Hole, belted m.d.
No. 1½x105" Pratt & Whitney Deep Hole, m.d., latest type (6)
5 spindle Detroit Semi-Automatic, belt
No. 420—2 spindle W. F. & John Barnes, m.d., latest
Pratt & Whitney Rifling Machine, belt
Snyder Tool Co. Double End Boring Machine, m.d.

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DRILLS

3'11" CANEDY-OTTO—RADIAL—220/3/60/1800—LATE TYPE—1942 Mfg.
3'9" AVEY—Sensitive—RADIAL—Belt drive
21" CANEDY-OTTO—BG—Upright—#4MT—220/440/3/60—PF to spdle.—V-belt Drive—NEW
16" SIPP—4 spdle.—Sensitive—#2MT—Belt Drive
16" ALLEN—4 spdle. — Sensitive — #2MT — Belt Drive
16" CANEDY-OTTO—Floor and Bench—Sensitive—½" chucks—110/1/60—NEW
16" AVEY—Floor—2 spdle.—Sensitive—Belt Drive

GRINDERS

10"x24" LANDIS—Universal—Hydraulic—220/3/60 Type C—1944 Mfg.—Used 3 Mos.
12"x48" CINCINNATI — Universal — Hydraulic — 550/3/60—LATE TYPE—1942 Mfg.
#2 CINCINNATI — Centerless "Filmatic" — 220/440/3/60—Thru Feed work rest—infeed work rest and infeed attachment—LATE TYPE—1943 Mfg.
#2 CINCINNATI—Tool & Cutter—220/440/3/60—Universal — large assortment of accessories—LATE TYPE—1941 Mfg.
6"x18" DO-ALL—Hydraulic—Surface—with elec. chuck—LATE TYPE
#2 BROWN & SHARPE—Surface—5x18—hand feed—MD—220/440/3/60—1943 Mfg.
6"x18" MONARCH—Surface — Hand feed — X10 mtzd. Spdle—550/3/60—with chuck
#60 HEALD—Cylinder
#TG-12 GRENBY—Internal—High Speed—PF—LATE TYPE
10"x48" MAJESTIC—Cylindrical—220/3/60—mtzd. work head—mtzd. wheel head pump—piping—LATE TYPE—1943 Mfg.
10"x24" NORTON—Cam Grinder—Mtzd.

LATHES & TURRETS

16"x6' SEBASTIAN—Type R-8 speed—Geared Head—Timken. Spdle.—NEW
20"x54" REED-PRENTICE — 16 speed — Geared Head—Taper Attach.—220/440/3 with additional equipment—LATE TYPE—1942 Mfg.
14"x30" LODGE & SHIPLEY—12 speed—motor in base—TA—chuck—stops—4 way tool post—220/440—other equipt.—1941 Mfg.
14½"x6' SOUTH BEND—chucks—motor in base—LATE TYPE—1943 Mfg.
14"x6' HENDEY—Geared head—factor MD—chucks—less mtr.
16"x6' HENDEY—QCG—Taper Attach.—chuck—collets—MD
#5 JONES & LAMSON—Universal Turret—LATE TYPE—Approx. 1943 Mfg.
#3 JONES & LAMSON—Universal Turret—220/3/60—with bar feed and chucking—LATE TYPE—1943 Mfg.
#2 WARNER & SWASEY—PF to turret—cross slide—BD—arr. M.D.

MILLING MACHINES

#3K K & T "Milwaukee" Plain Horizontal—Power rapid traverse—220/440/3/60—motor in base—LATE TYPE—1943 Mfg.
#3H K&T "Milwaukee" Plain Horizontal—Power rapid traverse—220/440/3/60—motor in base—LATE TYPE—1942 Mfg.
#2K K&T "Milwaukee" Plain Horizontal—Power rapid traverse—220/440/3/60—motor in base—LATE TYPE—1943 Mfg.
#3 CINCINNATI—Dial Type—Plain Horizontal—Power rapid traverse—220/3/60—LATE TYPE—1942 Mfg.
#2I GARVIN—Plain Horizontal—belt drive
#1 ROCKFORD — Plain Horizontal—Drive — All M.D.—3 Tee slot
GARVIN—Hand—Lever feed table—belt drive—stationary spdle.
#34 OHIO—"Osterlein"—Universal—Belt drive—new dividing heads
#2—24 CINCINNATI—Rise & fall—LATE TYPE—1942 Mfg.
#3H K&T "Milwaukee" — VERTICAL — Power rapid traverse—Power feed to head—motor in base—LATE TYPE—1942 Mfg.
#2H K&T "Milwaukee" — VERTICAL — Power rapid traverse—Power feed to head—motor in base—LATE TYPE—1942 Mfg.
#5 BECKER—Vertical—Belt drive—Motor bracket—12x48" table
#2 BROWN & SHARPE—Plain Horizontal—Light Type—220/440/3/60—LATE TYPE
#2 K&T "Milwaukee" Plain Horizontal—Dbl. Overarm

PRESSES

DP53 FERRACUTE—40 ton—SS—motor driven—220/3/60—Plain—with side shear 1940 Mfg.
#3K PERKINS—screw—NEW

SAWS

#4C COCHRAN-BLY—Cold—inserted tooth blade—MD—220/3/60
8x16 KALAMAZOO—Metal Cutting band—110/1/60—motor—equipment—contour sawing attachment—NEW

SCREW MACHINES

#0G BROWN & SHARPE—fully automatic—vertical slide attachment—Serial number 7500
#00G BROWN & SHARPE—fully automatic—serial # over 17,000—motor driven slotting attachment—LATE TYPE—1943 Mfg.
#00G BROWN & SHARPE—fully automatic—serial # over 14,000—motor driven slotting attachment—swing stop—other equip.—LATE TYPE
#00G BROWN & SHARPE—fully automatic—serial # over 11,000—motor driven slotting attachment—swing stop & equip.—LATE TYPE
#R4 NATIONAL ACME—4 spdle.—fully automatic—3½" cap.—220/440/3/60—complete assortment of equipment—LATE TYPE
#0 BROWN & SHARPE—fully automatic—belt drive
#R NATIONAL-ACME—4 spdle.—fully auto.—1⅝" cap.—LATE TYPE—extra equip.
2" GREENLEE—6 spdle.—fully automatic—motor driven—LATE TYPE—1942 Mfg.

MISCELLANEOUS

DIE FILER—Thiel—#3—motor 220/3/60
DIE FILER—Harvey "Butterfly"—Model EL—110/1/60—NEW
PLANER—Woodward & Powell—60"x60"x12'—2 rail heads—1 side head—box bed
PLANER—Woodward & Powell—48"x48"x14'—MD
PLANER—Woodward & Powell—30"x30"x12'—2 rail heads—2 side head—down feed and elevation—box bed—BD
PLANER—Whitcomb—24"x24"x6'—arr. for motor drive—less elec. equip. 1 rail head
PUNCH & SHEAR—Williams & White—3" cap.—wt. approx. 30,000#
HAMMER—Bliss—300#—board drop
CLUTCH CUTTERS—Waltham
PROFILER—Pratt & Whitney—#13—Gear Driven
SUPERFINISHER—Foster

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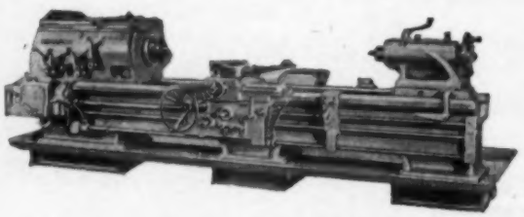

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KEMPSMITH #2G Plain Miller, Motor in Base, Arbor Support, Braces, Vise, Dividing Head

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Cincinnati 375 ton, 8'8" overall, 6'6" bet. housings, ⅞" cap.
Clearing #90-10, 12' overall, 10' bet. housings, 10 ga. New 1942.
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Pratt & Whitney #2A Jig Borer #3644 with equipt. New 1945—Barely used.

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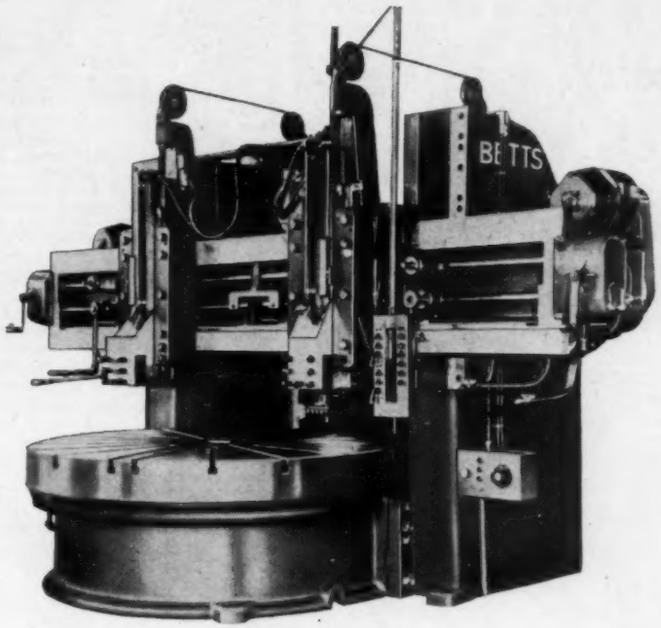

78" Betts Vertical Boring Mill, with two heads on rail; D.C. motor driven with AC/DC generator, complete with all electronic controls; late model, built during war period.

AUTOMATICS

9/16" RA-6 Acme-Gridley. New in 1943.
1" RA-6 Acme-Gridley. New in 1943.
2⅝" RA-6 Acme-Gridley. New in 1943.
1⅝"—8 spindle Conomatic. New in 1942.
5⅛" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe. 1941.
★ Bullard Multaumatic, six spindle model D, single index. Late model.

BORING MILLS

★ No. 41 Lucas Horizontal Boring, Drilling and Milling Machine, with auxiliary high speed drive to give spindle speed of 1200 RPM; with star facing head, dial indicator indexing device, motor and control. New in 1941.

BROACHES

No. 2SL LaPointe Hyd. Horizontal. 1942.
No. CPC 8-24 LaPointe Hyd. Vert. 1943.
No. CPC 6-36 LaPointe Hyd. Vert. 1943.

DRILLS

6 Ft. American radial 17" column.
★ No. 26HO Baker Hydraulic, single spindle, 3" capacity in steel, with motor and control. Latest type.
42" Cincinnati-Bickford, single spindle.
No. 1B Edlund Sensitive, S. S. 1943.
No. 3 Avey, three spindle, heavy duty.
No. 3 Baush Multiple Spindle.
Barnes Horizontal Deep Hole, 2 spindle.
Taft Peirce Horizontal, double end.

GEAR CUTTERS

No. 3616 Cleveland Rigidhobber. 1943.
No. 3, 12 Barber Colman Hobbers.
No. 16H Gould & Eberhardt Universal Hobber. Latest type.
No. 7A, 7125A Fellows Gear Shapers.
No. 615A, 645A, Fellows Gear Shapers.

GRINDERS

No. 2 Cincinnati Centerless, Filmatic spindle. New in 1941.
No. 3 Cincinnati Centerless, Filmatic spindle. New in 1941.
14" x 48" Cincinnati Plain, Filmatic spindle.
10" x 36" Landis Hydraulic. New in 1943.
6" x 18" Cincinnati Hydraulic, Filmatic spindle. New in 1943.
No. 3 Brown & Sharpe Universal. New in 1943.
No. 13 Brown & Sharpe Universal and Tool.
No. 2 Norton Universal Tool.
★ No. 36 Hanchett Vertical Rotary Surface Grinder, 36" chuck, 30 HP motor. New in 1943.
No. 18 Blanchard, 30" chuck. 1942.
30" x 24" x 192" Mattison Surface.
14" x 16" x 60" Mattison Surface.
No. 75A Heald Internal. New in 1943.
No. 72-A-3 Heald Sizematic. New in 1943.
No. 16-16 Bryant Internal, Hydraulic, Used less than 2 years.

LATHES, ENGINE

Monarch Toolmakers 10" x 20" Model EE.
Lodge & Shipley 20" x 48". New in 1943.
★ Bertram 28" x 240" "Timesaver", two carriages, with rapid traverse. Canadian made from Niles patterns. 1942.
Lodge & Shipley 48" x 54", cone driven.
Hendey 16" x 6', yoke head.
Carroll Jamison 15" x 5', c.d.
South Bend 14½" x 6', c.d.
LO-Swing, IMP & LR.
Lipe Carbomatic, 15" x 30".
LeBlonde Production, 17" x 30".

LATHES, TURRET

Warner & Swasey No. 2A, preselector. New in 1945.
Warner & Swasey No. 1A, preselector. New in 1940.
Gisholt No. 1L, hydraulic speed selector. New in 1943.
Warner & Swasey No. 5 Universal. 1943.
Gisholt No. 5 Universal, Hydraulic speed selector. New in 1944.
Foster No. 5 Universal, Bar feed. 1943.
Warner & Swasey No. 4 Universal, preselector. New in 1943.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 3 Universal, two speed. New in 1942.
Bardons & Oliver No. 3 Universal, motor in base. New in 1941.
Warner & Swasey No. 2, oversize. 1942.
Bardons & Oliver No. 2 bar feed. 1941.
Brown & Sharpe No. 1, M. in B. 1941.
★ Bullard New Era VTL, 36" x 42".

MILLS

Van Norman No. 2SU Universal.
Gorton No. 9J Vertical, with tracer.
Cincinnati No. 5 High Power, Plain.
Cincinnati No. 2MH Plain, latest model.
Cincinnati Universal, No. 3, M. in B.
Hydrotel, Cincinnati Vertical 28" x 60".
Cincinnati Vertical, No. 3, Med. S. Dial.
Milwaukee Vertical, No. 2H. New in 1942.
Ingersoll, adjustable Rail, 36" x 12'.

MILLS, HAND

Nichols, late type, speed to 1200.
Van Norman, latest model.
Whitney No. 6.
Standard No. 1.

MISCELLANEOUS

No. 5B Standard OBI Press. New.
No. 7 Kling Punch, 1¼" through 1", 72" throat.
No. 8-6 Zeh & Hahneman S.S. Geared Press.
Pratt & Whitney Profiler, No. 12B.
25" Gleason Quenching Press.
24" Cincinnati Worm Feed Rotary Table.

PLANERS AND SHAPERS

Cincinnati Planer, 42 x 42 x 20, D.C.
American 24" Shaper.
Gould & Eberhardt 24" Shaper.
Cochrane & Bly No. 14 Vertical Shaper.
Pratt & Whitney 6" Vertical Shaper.

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Avey & Allen 3, 4, 5, & 6 Sp.
Cincinnati-Bickford 3', 4', 5', & 6' Radials
Carlton 4' Radial
Niles-Bement-Pond 6' Radial

GRINDERS

Abrasive Nos. 33 & 34; No. 3B
Gardner & Besly 53" Horizontal Disc
Norton 6"x18" Hyd. Surface
Norton 6"x10"x36" Surface
Norton 15"x15"x72" Surface
Hill-Acme 18"x18"x96" Surface
Mattison 12"x16"x54" Surface
B. & S. Nos. 1, 2, 3, Universal
B. & S. Nos. 5, 10, 11, Plain; #13
Norton 6x32, 10x24, 10x50 Plain
Bryant Nos. 3B, 5, 6, 12 Internal
Heald No. 70-A, Internal
Cincinnati No. 1½ Tool & Cutter
Norton No. 2 Tool & Cutter
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
Fitchburg 36" Spline Grinder
Blanchard No. 16—30"
Heald No. 25-A Rotary Surface
Heald Nos. 70A & 72A Internal
P. & W. 14" Vert. B.B.; also 22".
Gardner No. 5 Disc

LATHES

Monarch 12"x30" CK (swings 18")
Hendey 14"x6' Y.H. Fact. M.D.
American 16"x6'—G.H.
Monarch 16"x8'—G.H.
Fitchburg 60"x22'
Midland No. 4 Turret
Gisholt No. 3L and No. 5

MILLERS

Milw. #2B Universal
Cin. #2 Universal
K & T #2HL & #4H Plain
Milw. No. 2B & 3B Double Overarm
B. & S. No. OY Production
Cin. Nos. 3, 4 Vert.
Becker Model C. Vertical
B. & S. No. 3B & 5B Plain
Kempsmith #2G Plain
Van Norman Duplex #0, #2, #10, #20
Rice-Barton 4" Spline
P. & W. 8", 10", & 12" Automatic
Cincinnati 18" & 24" Production
Sundstrand No. 00 and No. 2 Electromil
P. & W. 6x14 Thread
Lees-Bradner 6"x36" Thread
Cincinnati #5 M.D. Plain
Cincinnati No. 3 Plain, Late
K&T #2K, 3K Vertical

PRESSES

Bliss No. 1½ D.A. Toggle
1000 ton Toledo Knuckle Joint
WF 3000 ton Hydraulic
WF 157 Ton Vertical Hydraulic

SCREW MACHINES

B. & S. No. 00, 0, 2 Automatic
B. & S. No. 1 & 2 Hand Screw
Cleveland 1⅜" Model AA
W. & S. Nos. 1, 2, 2A, 3A Universal
W. & S. No. 5, Late
Foster No. 7 and No. 1B
Cone 1¼" 4 Spindle
Cleveland 3¾" Model A, Latest Type
Cone 3½"—4 Spindle
Cleveland 6¾" Model A
Cleveland 7¾" & 8" Model A
Gridley ⅞", 1¼, 1¾", & 2⅝", Model G; 3¼" & 4¼"
Cleveland 2½", Model K

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Cincinnati 36"x36"x16 ft. Planer, M.D.
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18"x24"x72" Mattison Surface Grinder
6"x18" Norton "C" Hydraulic Grinder
6"x30" Norton "C" Hydraulic Grinder
#1248 Kearney & Trecker SIMPLEX Miller
#3HS Cincinnati Vertical Miller
#2—#3—#4—#5 Warner & Swasey Universal Turret Lathes
#1 Brown & Sharpe Wire Feed Hand Screw Machines

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Automatic, 2⅜" Acme Gridley RA6
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Broach, Twin 10 & 3XA Oilgear
Broach, 2S, 3H & HP50 LaPointe
Broach, No. 5-42 Cincinnati surface
Drill, 3'9" & 4'9" Cint. Bick. radial
Drill, 21" & 24" Cint. Bick. upright
Drill, Nos. 11, 14 & 30 Natco multiple
Drill, Nos. 121, 217, 314, 315, 321 Baker
Drill, 24", No. 3 Aveymatic 2 spindle
Gear Hobber, Nos. 3, 12 & Type D Barber Colman
Gear Hobber, Nos. 16HS, 12H & 8H G. & E.
Gear Hobber, No. 5M Adams Mfg.
Gear Hobber, No. 130 Cleveland
Gear Hobber, Nos. 1 & 5AC Lees-Bradner
Gear Shaper, Nos. 7 & 61 Fellows
Grinder, Centerless, Nos. 2 & 3 Cincinnati
Grinder, 6"x18" No. 10 Brown & Sharpe
Grinder, 10"x18" & 10"x96" Cincinnati
Grinder, 6"x18" & 14"x36" Landis
Grinder, 6"x18" & 10"x72" Norton
Grinder, 12"x36", No. 2 B. & S. univ.
Grinder, Disc, No. 226 Gardner
Grinder, Surface, 10"x24" Norton hydraulic
Grinder, Surface, 12"x48" Thompson hydraulic
Grinder, Surface, 14"x60" Mattison hydraulic
Grinder, Surface, 12", 16" & 24" Heald rotary
Grinder, Surface, Nos. 10 & 16 Blanchard rotary
Lathe, 22"x96" Monarch
Lathe, 25"x48" LeBlond
Lathe, 36"x16' bed Bridgeford
Lathe, Turret, Nos. 2, 3, 4, 5 & 1A & 3A Warner & Swasey
Lathe, Turret, Nos. 3 & 7A5 Jones & Lamson
Lathe, Turret, No. 3, 4, 5 & 1L Gisholt
Lathe, Turret, No. 2 Cint. Acme saddle type
Lathe, Turret, No. 601 Oster
Lathe, Turret, No. 5 Foster
Lathe, Turret, No. 5 Bardons & Oliver
Lathe, Turret, Nos. 2G & 3 Morey
Lathe, Turret, 24", 36" & 42" Bullard vertical
Lathe, Mfg., 14"x18" Monarch Magnamatic
Lathe, Mfg., 6", 8", & 15" Sundstrand auto. stub
Lathe, Mfg., Mod. 10x40" Sundstrand center drive
Mill, 3⅛", No. 0 Giddings & Lewis
Mill, 3½" bar Universal
Mill, 4¾" bar Giddings & Lewis floor type
Mill, Vertical, 53" x 100" Niles-Bement-Pond
Mill, Vertical, 96" Cincinnati
Millers, Nos. 2AS, 3B & 4B Milwaukee plain
Miller, No. 3 Cincinnati universal
Miller, No. 3 Van Norman duplex
Miller, Nos. 3 & 4 Cincinnati dial type
Miller, Nos. 2M, 2, 3, 4 & 4HD Cincinnati vertical
Miller, No. 2H, 3H & 4H Kearney & Trecker vertical
Miller, Nos. 2-24, 3-24, 4-36, 4-48, 5-48, 5-60 Cincinnati Hydromatic
Miller, Nos. 3-24 & 5-60 Cincinnati duplex Hydromatic
Miller, No. 12-24" Brown & Sharpe Mfg.
Miller, 30" & 66" Newton rotary
Miller, 30", 42" & 84" Ingersoll rotary
Miller, Nos. 4 & CT36 Lees-Bradner thread
Miller, No. 3 Planomill thread
Press, Nos. 10, 73½ & 304 Bliss S.S.
Press, Nos. 56 & 56½ Toledo S.S.
Press, No. 4A Bliss horning
Press, 70 ton Verson, cushion
Press, 100 ton Toledo coining
Press, 100 & 200 ton Hydraulic
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Saw, 42" Tannewitz metal band
Shaper, 6" Pratt & Whitney vert.
Shaper, 12" Whipp
Shaper, 16", 20" & 28" Gould & Eberhardt
Shaper, 20" & 24" Gemco universal
Shaper, 32" Ohio heavy duty
Shaper, 36" Rockford shaper planer
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30" x 18' American G H
36" x 28' Lodge & Shipley G H
60"x15' centers Niles G H

RADIAL DRILLS

3½' Cincinnati Bickford
4' Carlton, motor on arm
7' Carlton, motor on arm
8' American, motor on arm

MILLERS

No. 5 Cincinnati Plain
No. 3B Milwaukee Plain
1-B Milwaukee Universal

BORING MILLS

24" Bullard, New Era
84" Cincinnati 2-swivel heads
12' Betts 2 swivel heads
12' N.B.P. 2 swivel heads
16-24' Niles extension type
3" spindle Universal Tri-Way
4½" spindle No. 33 Lucas
6" Spindle Jones floor type

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150" Muir gear Hobber
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18' Power Plant Hobber
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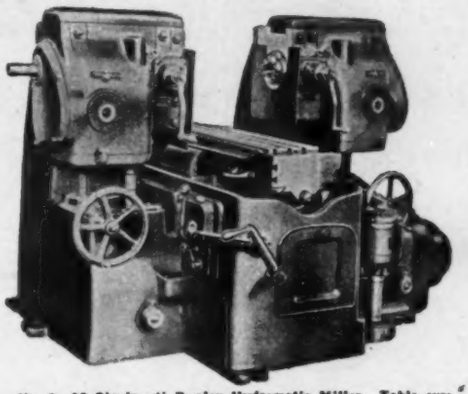
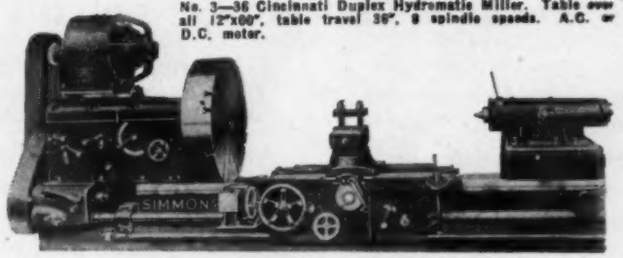


No. 3—36 Cincinnati Duplex Hydromatic Miller. Table over all 12"x00". table travel 36", 8 spindle speeds. A.C. or D.C. motor.



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No. 44-P Toledo Horn Press, Arr. for Grd., M.D.
No. 16 Bliss Horn Press, Vee Belt, M.D.
Nylint Dbl. End Gage Grinder, M.D.
No. 1 Wilmarth & Morman Surface Grinder, M.D.
No. 33 Abrasive Surface Grinder, M.D., Chuck & Rectifier
No. 1-B Milwaukee Plain Mill, Sgl. Pulley, M.D.
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#3 Waterbury-Farrel punch press, capacity 20 ton stroke 2½", ram adjustment, 60 strokes per minute, shut height, 6½", bed size F to B 10½", R to L 14½" $475.00

#6600 Waterbury-Farrel punch press, cap. 56 ton, vertical back geared, open back, straight sided stroke 6", 60 strokes per min., 20" shut height, distance between uprights —46", bed size 10"x45", 5 HP motor, push button switches, V drive $1750.00

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Boring Mills, 24"-36"-42"-52"-72"-96"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
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Millers, Plain No. 3 K & T, No. 4 Cin.
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Profiler, #13 P. & W., B.D.
Shapers, 16"-20"-24"-36".
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5" Niles horiz. boring mill, late table type.
20—#2 Kent Surface Grinders, 1943
#11 Blanchard rotary grinder 1941
#13 Brown & Sharpe Univ. grinder, 1943
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GRINDER, Surf. Hyd. G & L 14"x18"x72"—1942
GRINDER, Surface, No. 25 Heald Rotary
GRINDER, Univ. 12"x72" Cincl. Hyd.—1941
LATHE, 24"x16' B & E Grd. Hd.—1940
LATHE, 27"x18' Niles "Timesaver," Grd. Hd.
LATHE, 36"x22' N-B-P, Grd. Hd. Q.C.G.
LATHE, 38"x19' Putnam, Grd. Hd. Q.C.G., T.A.
LATHE, 42"x50' Putnam, Grd. Hd.
LATHE, Tur. No. 3 W & S (Late)
MILLER, Plain, Nos. 3S, 4 & 5 Cincinnati.
MILLER, Univ. No. 36 Van Norman
MULT-AU-MATICS, Bullard Type A, 6 Spdls.
PLANER, Openside, 36"x36"x12' Cleveland
SHEAR, Plate 84"x¼" Canton, M.D.

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#2MH Cinci. Univ. Miller 1944
#3SP Van Norman Miller 1942
Nos. 2, 3, 4, Cinci. Vert. Miller '42, '45
#2, 3, 4 & 5 W. & S. Univ. &
#3 J. & L. Univ. Turret Lathes
#712 Fellows Gear Generator, 1942
36H & 48H G.&E. Gear Hobbers
30"x15' centers Amer. Super Pro. Lathe
18" raised to 24½" x 192" centers, BB
Model Monarch, Carr. P R T., '42

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Cincinnati 375 Ton Press Brake—6½x⅝, New 1942
Clearing 90-10 Press Brake—10' 10 Ga.
Ryerson #4 Comb. Punch & Shear
Gorton Duplicators and Vert. Millers
Gorton No. 3Z, 3L, ME engraving machines
B. & S. No. 2 Vert., Swivel Head
Norton, Doall Surface Grinders 8"x24"
Marvel 6A Hacksaw, M.D., Auto. Feed
Injection Moulders, Hydraulic Presses

BORING MILLS

#0 Giddings & Lewis arr. M.D.
2½" Cleveland arr. M.D.
2⅞", 4" Binsee
Niles-Bement-Pond 4" duplex
Universal 3"
66" Niles; 54" Colburn M.D. 2 hds.
Bullard New Era 24", 42", Vert. M.D.

TURRET LATHES

W. & S. Nos. 3, 4 Grd. Hd., Preselector
Gisholt No. 1L, 2L Univ. M.D.
Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
J. & L. 2¼"x24", 3¼"x36"
Acme #2 M.D.

GRINDERS

No. 34 Abrasive Vert. Surf. #3B, 8x24"
#25 Gallmeyer & Livingston Hyd. Surface
#25A Heald, M.D. like new Rotary Surf.
No. 2 Cincinnati Centerless M.D.
B. & S. No. 2, 2B Surface, M.D.
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D.
Heald No. 72A3 Gagematic
Norton 50"x28', M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D.
No. 55, 60, 65 Heald int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11 Cyl.; 1, 3 Univ.
Norton 6x18" 8x24" Hyd. Surface, M.D.
Covel #91A Tool & Cutter New 1941

LATHES

Monarch Hendey 12x30, 10x20 G.H. Late
26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey, Taper, Collets 16"x8'
9" LeBlond P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
20"x30' Boye & Emmes Grd. Hd.
16x10' South Bend, late, M.D., T.A.

AUTOMATICS

Cleveland Model A ⅞", 1¼", 2"; B 1", 2"
⅞" Cone 4 spindle, Gridley
B & S No. 2 Hand Screw
Brown & Sharpe 0G. New 1941

New in Stock
Power Shears—52", 72" & 96"

Spot & Arc Welders
5, 7, 14, 18 & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8" Shapers
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Drill Presses, Foot Presses
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20 ton Northern Hydraulic Presses

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6' Cincinnati-Bickford
4' Fosdick 13" col., 8' Carlton, 19" col. M.D.
4', 5', 6' American Triple Purpose

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Cinn. #3 Pl., #4 Vert. Dial Type, Rect.
#3 K. & T. Dbl. overarm, motor in base
Cleveland Vert. No. 1 M.D.; #1 Univ.
#12 Van Norman, Duplex
#2B K & T Univ.; No. 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No. 1, 3, Vert.
B. & S. #12 Elec. Prod. late type, #21

MISCELLANEOUS

Wiedman Turret Punch—Type R4P
Buffalo #0 Angle Roll MD.
#20 Bliss OBI, #58-OB Gap Presses
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
Pexto 6' Power Shears
Burke & Nichols Millers, Pl. & Univ.
Delta Single & Multiple Drills
Deckel G1, G2 Engraving machines
Landis Dbl. Head Bolt Threader, 2½"

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MDNA MEMBER

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3—L. & S. 12"x6', 12 speed, selective grd. hed., pan bed, Tool Room Lathes, sw. over ways 14½", dist. betw. cens. 34".

1—Bridgeford 36"x56', 15 speed, grd. hed., Eng. Lathe, M.D. AC elec. equip. power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 26" over carr., dist. betw. cens. 48', mtzd. apron and taper attmts.

HOR. BORING MILLS

1—Yoder #3A Hor. Bor. Mill, diam. of bar 3", Morse Taper #5, dist. to outer support 72", bar trav. 24", latest type, motor driven.

VERT. BORING MILLS

1—Bullard 42" "New Era Type" Vert. Bor. Mill, with side hed. coolant crowning attmt., 4 jaw type chuck, capac. 44" diam., 33" cross rail, 43½" under turret face, M.D.

2—Bullard 38" "Spiral Drive", Vert. Bor. Mill face of turret to tbl. 34", clear under cross rail 27¼", vert. trav. of turret 26⅜", clear under S.H. slide 18", 3 and 4 jaw chuck, approx. wght. 17,500 lbs.

MILLING MACHINES

B. & S. 1½A Bk. Grd. Constant Speed, Univ. Miller, tbl. wkg. surf. 36¼"x10¾", power feeds long. 24½", cross 7½", vert. 19", AC motor driven.

1—Cin. #5 Plain Hor. Mill. Mach., rect. overarm High Power Miller, tbl. wkg. surf. 79"x21" power long. feed 50", cross 14", vert. 21".

2—Cin. #3 Hor. Dial Type Millers, latest type, tbl. wkg. surf. 58½"x15", long. feed 34", cross 12", vert. 20", spindle speeds 18-450 RPM.

GRINDERS

1—Mattison Hyd. Surf. Grinder, capac. 16"x24"x 72" with power raise and lower to vert. hed., horiz. spin. complete with mag. chucks, latest type.

Blanchard #11 Roty. Vert. Surf. Grinder, range 20" diam. x 8" high, 16" chuck, 1200 RPM, very latest type.

1—B. & S. 1, 2, 3, and 4 Univ. Cyl. Grinders, capac., 10"x20" (No. 1), 14"x30" (No. 2), 14"x 40" (No. 3), 14"x60" (No. 4) very latest type.

MISCELLANEOUS

1—P. & W. #B L Model 2416, Keller Duplicating Machine, tbl. wkg. surf. 42"x22", tbl. trav. horiz. 24", vert. 16", trans. 8"—very late type, 3 dimesion, complete with angle plates control cabinet.

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All Motor Driven — Guaranteed
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16"x30" Springfield Geared Head Lathe

20"x48" LeBond Geared Head Lathe

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36" Lehmann Hydrotrol Geared Head Lathe

48"x20' Centers Niles Geared Head Engine Lathes

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#2SP and #3SP Van Norman Plain Millers

#3 and #4 Cincinnati Plain Millers

#2, #3 and #4 Cincinnati Vertical Millers

#4 Cincinnati High Power Vertical Miller

#3H, #4H Milwaukee Vertical Millers

36"x48"x10' Liberty Openside Planer

10"x7" Bliss Rolling Mill

2⅝" Acme-Gridley Model RB Six Spindle Automatic Screw Machine

#2, #3, #5 Warner & Swasey Universal Geared Head Turret Lathe

Two—#4A Warner & Swasey Universal Geared Head Turret Lathes

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#44 UNIVERSAL Tri-Way, Table Type.

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#2 B & S Surface, M.D.
#2 REID Surface, M.D.
#10 B & S Tool & Cutter, M.D.
#72A3 HEALD Plain & Sizematic, M.D.
#4T SELLERS Tool Grinder, M.D.
9" P & W Hyd. Gear Grinder, M.D.
#5 B & S Plain Grinder, M.D.
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6—#4H LANDIS 4"x12" & 4"x18" Plain Grinders, M.D., with hyd. straight infeed, hyd. timer & hyd. footstock.
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14"x54" LODGE & SHIPLEY G.H. Lathe, M.D.
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14"x30" LeBLOND Hvy. Duty, M.D.
16"x30" MONARCH Mod. "C" Lathe, M.D.
16"x54" LeBLOND Hvy. Duty, M.D.
16"x6' SEBASTIAN Lathe, M.D.
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MILLING MACHINES

#5/60 CINCINNATI, Duplex Hydromatic Milling Machine, tracer control mechanism for automatic rise & fall of spindle carriers, M.D., machine used six months.
#1G & 2G KEMPSMITH All Geared Univ., M.D.
#2L VAN NORMAN Universal Miller, M.D.
#2H K & T Vert., Power Feed, M.D. (3)
#2MS CINCINNATI Dial Type, Plain, M.D.
#4MS CINCINNATI Dial Type, Plain, M.D.
#3HS CINCINNATI Dial Type, Vert., M.D.
#5H KEARNEY & TRECKER Plain, M.D.
#M-50A TAYLOR & FENN Vert., M.D.
#12-M MOREY 2-spdle PROFILER, M.D.

TURRET LATHES

#0G B & S Auto., M.D.
#0 B & S Wire Feed Screw Machine, M.D.
#2G Morey Ram Type, M.D.
#3 W & S Ram Type Univ., M.D.
#3 J & L Ram Type Univ., M.D.
#1A W & S Saddle Type Univ., M.D.
#2A W & S Saddle Type Univ., M.D.
#4A W & S Saddle Type Univ., M.D.

MISCELLANEOUS

6'x48" THOMPSON Broach Grinder.
#36-H GOULD & EBERHARDT Gear Hobbers.
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Used Bases for 4' & 6' CINCINNATI BICKFORD Radials
#4—48" B & S Gear Cutter
40"x32"x51" OHIO Tilting & Revolving Rotary Table for Horizontal Boring Mill.

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(Motors 3/60/220 & 440.)

Blowers, No. Am. 1, 2 & 10 H.P. 3/60.
Boring Mill 42" Bullard, "New Era".
Grinder, #13 B. & S., steel cabinet. (1945)
Grinder, G. & L. Surface, 14"x72", Mag. Ck.
Lathe, 18—24"x14' centers Monarch, chuck.
Lathe, 608 Rivett BB., 1¼" HS; TA; QCG.
Lathe, 9x24" Hardinge, compound & collets.
Miller, #36 Van Norman, Index Head, subhead, rotary table and pump.
Press P2 Ferracute (Near New).
Riveter, Hanna, 36x24", cyl. 15", truss frame.
Shaper 24" Gould & Eberhardt, gear box, M.D.

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Two—54"x108" Herman Pneumatic Machine Co. Independent turnover and pattern drawing, 10,000 lb. capacity.
Two—48"x108" 20" solid cylinder jarring molding machine, heavy duty bumper type.
One—1 Ton—1—Two ton Heroult complete.

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NATCO 3 way Hor. Tapping Machine ⅜" cap.—45 spdls.
Model R, Seneca Falls Automatic Lo-Swing Lathes
Foote-Burt 9 sp. Hyd. Drill, fixed spindles, No. 4 and No. 5 M.T. (5)
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Lees-Bradner Model 40 Thread Millers
P&W—2 sp. Hor. Deep Hole Drill
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Engine Lathe, 32"x14' Alliance G.H.
Turret Lathes, Denver Acme Model 6.2 (6)
Engine Lathe, 48"x32' Niles
Boring Mills—Vertical and Horizontal

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GRAUTNESS dble. end Flanger MD, Hand fed 14" dia. up.
GRAUTNESS MD, adjustable drum corrugator.
BUCKEYE HYDRAULIC PRESS: 400 ton 4 col. up moving ram stroke 36", daylight 72", Platen 22"x36".
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READING KEYSEATER (New).
WHITNEY ANGLE IRON BENDER (New).

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Hanchett 3 spindle vertical Grinder with 72" magnetic chuck. Tremendous capacity for small flat work.

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16"x10' HENDEY Tool room, yoke head, taper, collets, chuck, Rel. attch.
16"x10' HENDEY, Grd. Hd., taper, collets, chucks, M.D.
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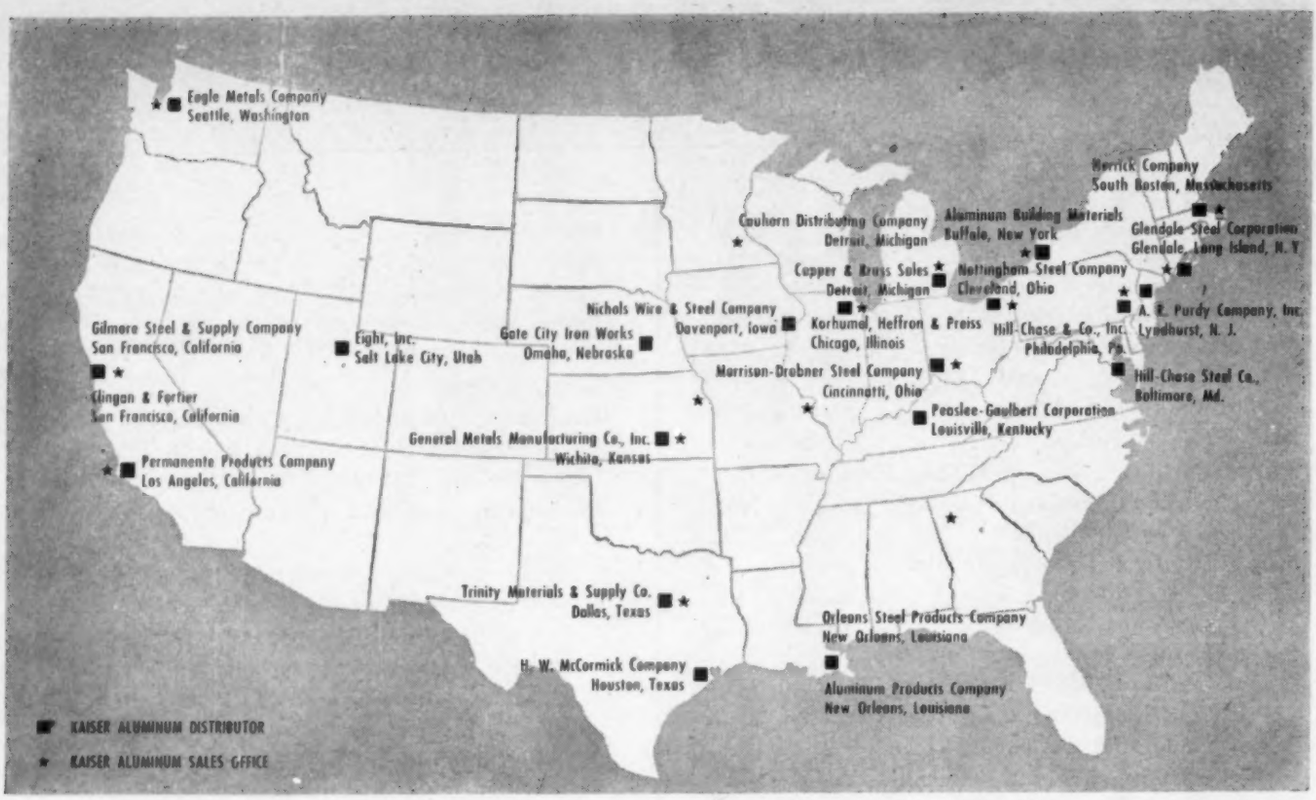

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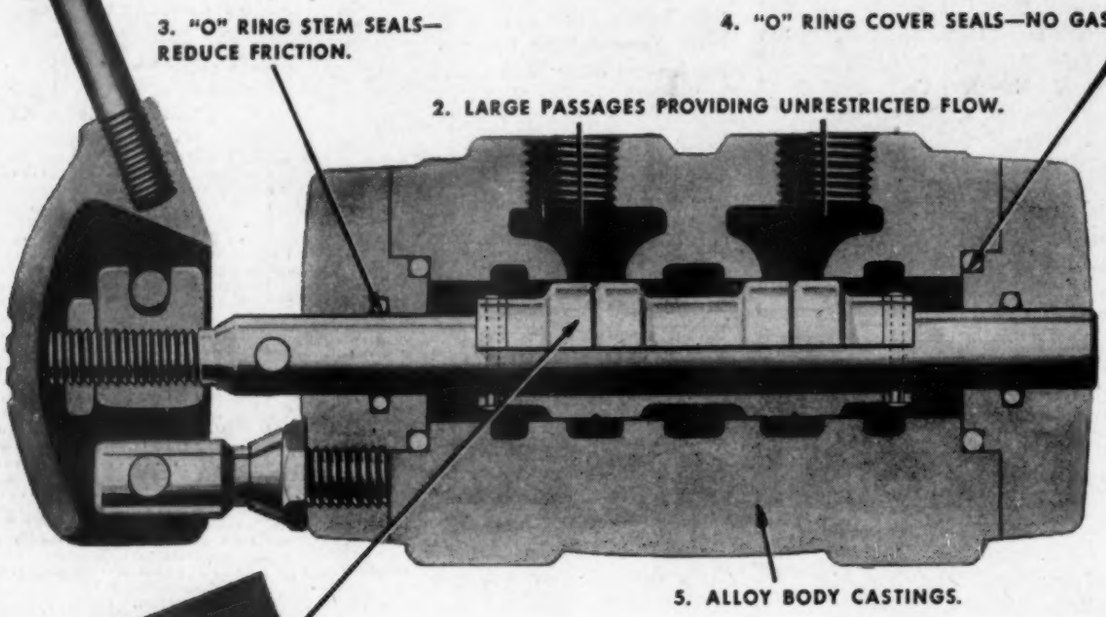
GEROTOR

4-WAY

hydraulic valves

DON'T BIND • DON'T LEAK


3. "O" RING STEM SEALS—REDUCE FRICTION.
4. "O" RING COVER SEALS—NO GASKETS.
2. LARGE PASSAGES PROVIDING UNRESTRICTED FLOW.
5. ALLOY BODY CASTINGS.

1. FLOATING PISTON

Feature No. 1 is **reason** No. 1 why GEROTOR Hydraulic Valves operate without binding or leakage. The "floating piston" design permits an extremely close fit in the valve bore, independent of the stem fit in the covers. Hardened and precision-machined, the "floating piston" also assures easy operation, long life.

GEROTOR 4-way Hydraulic Valves, for oil service up to 1,500 p.s.i., are offered in 4 types of action . . . 5 piston designs . . . 6 types of operation . . . 7 sizes. Write for Catalog Section 200.

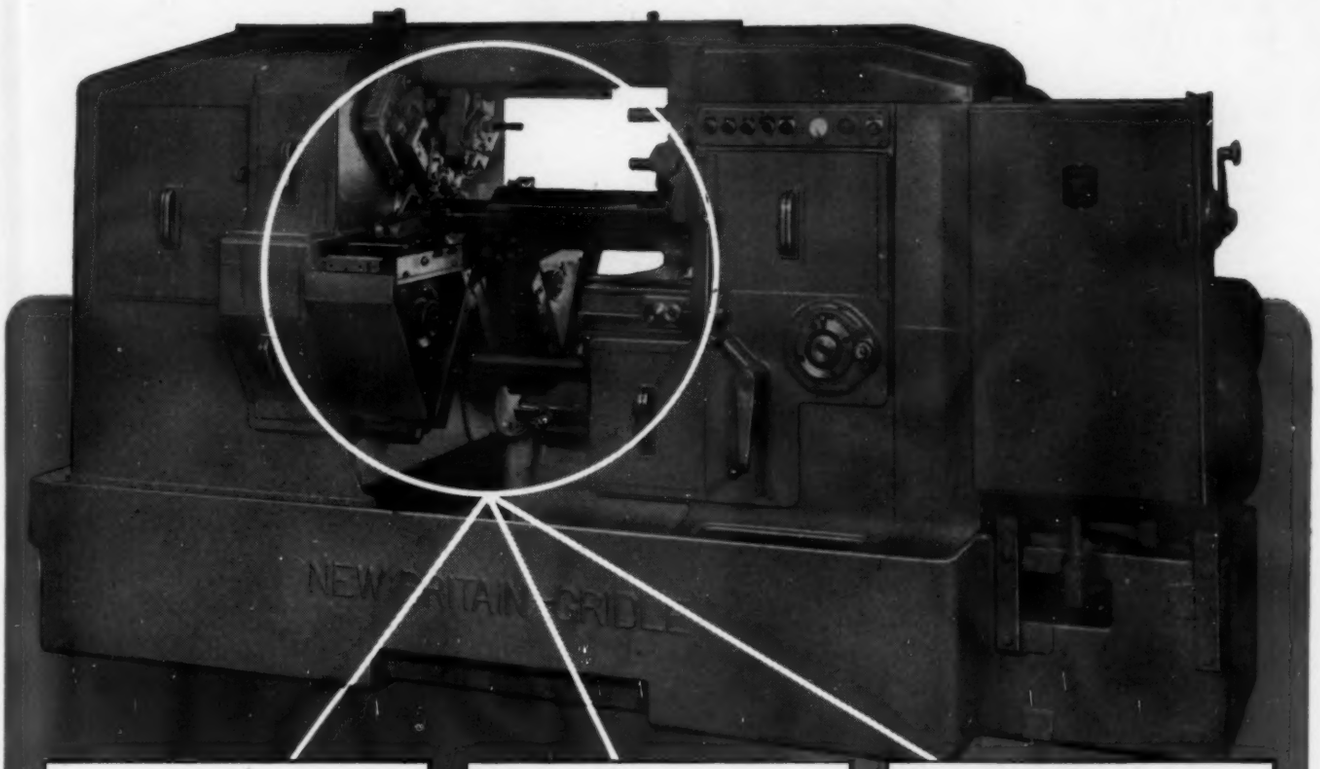
GEROTOR MAY CORP., Baltimore 3, Maryland

GEROTOR

hydraulic pumps, motors, valves and cylinders • air valves and cylinders

NEW BRITAIN'S NEW LINE OF SCREW MACHINES

Answers the Need for Lower Costs and Higher Productivity



QUICK SET UP

1. No cam to change for main tool slide. Strong, positive universal cam selects feed stroke without changing high point, stops or total stroke.
2. No cam to change when adjusting stock feed-out length.
3. Cross slide cams directly behind slides minimizing linkage. Remove three screws with cover and cams pull off.
4. Micrometer adjustment in both directions on all cross slides, all independent of stops.

SYMMETRICAL RADIAL TOOLING

1. Five heavy-duty forming slides and cut off slide evenly spaced about carrier making line of forming thrust identical in each position.
2. Tool holders interchangeable among forming slides, also on main tool slide.
3. Greatly increased chip clearance and capacity so essential with carbides.
4. Flexibility for auxiliary threading attachments. Accelerating drives in every position.

FOOLPROOF, AUTOMATIC OPERATION

1. Shoulder height, complete control panels at front and rear of machine.
2. Automatic stop shuts off machine and flashes red light when spindle is empty.
3. Program wheel on outside of powercase shows complete cycle of machine.
4. Machine stops if lubricating oil pressure is low.
5. Gage indicates when machine is operating at other than normal load.

Fast, powerful machines which will outperform anything modern tools will handle and anticipate future tool developments. These new machines with their initial and permanent accuracy also incorporate all the previous exclusive features by which NEW BRITAINS are recognized. To these qualities have been added new features, making it possible to accomplish quick setups where short runs are the rule. Built massive to handle the horsepower required for steady feeds for carbides on tough forming steel jobs, they are also designed for super high-spindle speeds, essential for brass and aluminum. Six spindles up to 2¼" capacity.

THE NEW BRITAIN MACHINE CO. NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

M-01062

How Timken stainless steel forging bars give you UNIFORMITY ALL THE WAY

Uniformly good surface and internal quality

1 You can depend on the uniformly high quality of Timken stainless steel forging stock. Physical and chemical properties of each analysis are always the same.

Uniform forgeability

2 From bar to bar and from heat to heat, Timken stainless steel gives you uniform, top-quality forgings, free from splits or checks. You have fewer rejects.

Uniform machinability

3 Every one of your Timken stainless steel forgings machines the same way—fast, easily, with a good surface. Scrap loss is cut—machining time saved.

Uniform finished product

4 Because Timken stainless steels have uniformly good surface and internal quality, uniform forgeability and uniform machinability, the high quality of your finished product never varies.

THE OUTSTANDING UNIFORMITY of Timken stainless steel forging bars is a result of: 1. Specialized skill of Timken metallurgists, developed through years of experience in the production of fine alloy steels; 2. Precise quality control from melting to final inspection; 3. The Timken Company's long-time leadership in alloy steel research; 4. Special practices which are practical only in a large, flexible specialty mill.

Timken stainless steel is tailor-made to meet your specifications for chemical and physical properties. Our Technical Staff will be glad to recommend the correct analysis for your individual requirements. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.